Metals, Mechanical Equipment and Electrical Equipment Sector Skills Agreement

Stage 3: Gap Analysis – United Kingdom

Semta

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1. The MME Sector Skills Agreement

1.1. Introduction

Semta is one of 25 Sector Skill Councils (SSCs) that have been established by government to tackle the skills and productivity needs of their sector throughout the UK. They are independent employer-led, UK wide organisations that cover different business sectors of economic or strategic significance.

Each SSC agrees sector priorities and targets with its employers and partners to address four key goals:

1. Reducing skills gaps and shortages
2. Improving productivity, business and public service performance
3. Increasing opportunities to boost the skills and productivity of everyone in the sector's workforce, including action on equal opportunities
4. Improving learning supply, including apprenticeships, higher education and national occupational standards

The key mechanism for identifying and articulating how industries are going to raise their performance in tackling these goals will be through the development of Sector Skills Agreements. Sector Skills Agreements are intended to place employers' needs centre stage and give them a powerful voice in how public money on skills is spent.

This report represents the outcomes from the third stage of the Sector Skills Agreement process. The research undertaken as part of the stage 1 and stage 2 research enabled the production of detailed reports that brought together the key supply and demand issues facing each industry within the metals, mechanical equipment and electrical equipment (MME) sectors. These various consultation reports provided the basis of a comprehensive programme of 'market testing', which represented the key component of the stage three programme.

The aim of the stage 3 programme has been to communicate the key supply and demand issues and outline potential solutions which would improve future business performance within the sector. In this regard an important focus of the stage 3 programme has been to reach agreement with employers and partners on the actions needed to ensure that the future supply of skills meet the short and longer term demands of businesses within the MME sector.

1.2. Definition of the MME sectors

Semta is responsible for the skills interests of employers in the Science and Engineering sectors. Sector Skills Agreements have already been undertaken in the Electronics, Automotive, Aerospace, Marine and Bioscience sectors; this MME SSA covers the remainder of the Semta Engineering footprint as shown in Table 1.1 below.

Table 1.1: SEMTA Engineering Manufacture SIC codes covered by Metals, Mechanical and Electrical SSA

Standard Industrial Classification (SIC) Code	Description
27	Manufacture of Basic Metals
28	Manufacture of Metal Products
29	Manufacture of Mechanical Equipment
31	Manufacture of Electrical Equipment
51.52/51.57	Wholesale of Metals/Ores/Waste/Scrap

Source: Office for National Statistics, Standard Industrial Classification, 2003

1.3. Sector Skills Agreement

Sector Skills Agreements (SSAs) are UK wide agreements designed to ensure that employers have a workforce of individuals with the necessary skills for their organisations to be effective, productive and competitive. They are created by a process which involves a number of partners including employers, trade associations / employer bodies, and organisations that supply and fund education and training. There are five stages to the process:

Table 1.2: The 5 stages of the SSA process

Stage	Description of stage
i.	A sophisticated assessment is made of each sector to determine short-term, medium-term and long-term skills needs and to map out the factors for change in the sector
ii.	Current training provision across all levels is reviewed to measure its range, nature and employer relevance
iii.	The main gaps and weaknesses in workforce development are analysed and priorities are agreed
iv.	A review is conducted into the scope for collaborative action – engaging employers to invest in skills development to support improved business performance – and an assessment is made into what employers are likely to sign up to
v.	The final outcome is an agreement of how the SSC and employers will work with key funding partners to secure the necessary supply of training

This document summarises research findings and analysis from stages 1 and 2 of Semta's MME SSA and puts forward the main gaps and weaknesses in workforce development within the sector as a basis for future action planning within the United Kingdom (UK).

2. Policy Context in the UK

2.1. Introduction

The Leitch Review of Skills has set the current UK skills agenda by outlining the case for investment in training and upskilling within the workforce.

Skills were identified by Leitch as a vital determinant of prosperity, driving national productivity and employment, businesses ability to take advantage of new opportunities and individuals' career prospects. The Review found that fundamental changes underway in the global economy meant that the future prosperity of advanced economies such as the UK increasingly depend on their skills bases.

The review recommends that the UK commits to a compelling new vision to become a world leader in skills by 2020. Leitch considered that this meant increasing skills attainment at all levels by 2020 so that:

- 95% of working age adults have basic skills in both functional literacy and numeracy rising from 85% and 79% respectively in 2005;
- More than 90% of adults are skilled to GCSE level or to vocational equivalent rising from 70% in 2005
- The number of apprentices in the UK is boosted to 500,000 each year, with improved quantity, quality and esteem for intermediate skills; and
- More than 40% of adults are skilled to graduate level (Level 4) and above – up from 29% in 2005

The review states that this vision will be achieved by:

- Increasing adult skills across all levels.
- Routing all adult vocational skills funding through 'Train to Gain' and 'Learner Accounts' by 2010.
- Strengthening the employer voice by giving employers more strategic influence over the skills strategy and system.
- Increased employer engagement and investment in skills.
- A new "pledge" for employers to train all eligible employees up to Level 2 in the workplace.
- Increasing employer investment in Level 3, 4 and above qualifications in the workplace.
- Doubling apprenticeships and improving employer engagement with universities.
- Increasing people's aspirations and awareness of the value of skills.
- Creating a new integrated employment and skills service locally to increase sustainable employment and progression. It was considered by Leitch that workless people should have a better diagnosis of their skills needs to enable them to make the transition into work.

Leitch particularly emphasised the importance of improving the skills of those already in the labour market and introduced the possibility of a legal entitlement to workplace training if progress falls short in 2010. This reflects a determination to tackle training and upskilling across all sectors of the economy.

In addition to Leitch a number of key drivers of strategic importance in each of the four nations also need to be considered as an essential policy context to learning and skill development within the MME sector.

2.2. Policy context in England

2.2.1. The national skills strategy for England

The national skills strategy for England[1], launched in July 2003, examined the state of skills in the UK and came to the conclusion that that the UK was suffering from a skills deficit compared to countries with similarly advanced economies within Europe and the USA[2]. This deficit was considered to be particularly acute within the technician, higher craft and associate professional occupations.

The national skills strategy also introduced a number of key measures, which included the:

- Introduction of a new entitlement to free learning for all those studying for their first level 2 qualification as a skills foundation for employability. This measure could potentially be important to the parking sector, which has a relatively high proportion of people with no qualifications within its workforce[3].

- Provision of targeted support for higher qualifications (technician, higher craft and associate professional skills at level 3) in priority areas to meet sectoral and regional needs.

- Development of more flexible qualifications, including:

    - Dividing more qualifications into units, so accreditation can be built up more easily.
    - Speeding up accreditation of qualifications.
    - Improving assessment of people's existing skills and knowledge.

- Improvement of information, advice and guidance (IAG) services for adults.

- Extension of access to free information and communications technology (ICT) learning – ICT is classified as a basic skill along with literacy and numeracy.

- Raising the quality of Modern Apprenticeships and lifting the age cap for participation.

[1] 21st Century Skills – Realising our Potential, The National Skills Strategy for England, July 2003.
[2] Although [2] 21st Century Skills – Realising our Potential contains a UK wide analysis, the Department for Education and Science indicated that the strategy was primarily concerned with England.
[3] For example, an analysis of data from the Annual Population Survey 2006 indicates that about 30% of car park attendants in the UK had no qualifications compared to a figure of about 10% for the economy as a whole. Further analysis of qualification levels within the parking sector is included within Chapter 5 of this report dealing with current skill needs.

- Encouragement of local learning communities.

- Reduction of bureaucracy and introduction of more straightforward audit requirements.

- Learning provision to meet the following criteria:
  - Led by needs of employers and learners.
  - Shaped by skills needs prioritised by sector, region and locality.
  - Make the best use of ICT to deliver and assess learning.
  - Give colleges and training providers maximum discretion in deciding how best to respond to needs.

2.2.2. The 14-19 Education and Skills White Paper

The White Paper[4] sets out proposals, which build on the existing education system, but are designed to:

- Ensure that every young person masters functional English and maths before they leave education.

- Improve vocational education.

- Stretch all young people and help universities to differentiate between the best candidates.

- Re-motivate disengaged learners.

- Ensure delivery.

2.2.3. Skills White Paper 2005

'Getting on in business, getting on at work'[5], focuses on the skills of adults already in, or seeking to enter, the labour market. The aim is to help even more adults get the skills they need to move from welfare into jobs, and to progress in their careers.

At the regional level, the Regional Skills Partnerships of the Regional Development Agencies, the LSC, Jobcentre Plus, Small Business Service and Sector Skills Councils are seen as the key regional economic development players in integrating regional activity on training, jobs, innovation and business support, creating dynamic regional economies and so tackling disparities between regions.

The White paper indicated that training is to be built up from employers' needs, and delivered in the workplace to suit their operational requirements. The government intends to place purchasing power in the hands of the employer, so that they can determine how public funds are best spent to meet their priorities, rather than funds being routed direct to providers.

The White Paper is therefore proposing to give employers of all kinds – private, public and voluntary sector – more choice over the training provider they wish to work with. It is intended to be a new form of partnership between the government

[4] The 14-19 Education and Skills White Paper, Department for Education and Skills, February 2005.
[5] Skills: Getting on in business, getting on at work, The Government Skills White Paper; March 2005.

and employers to enhance learning opportunities and meet skills needs. At the heart of the programme is a brokerage service that will work on behalf of the employer. Employers will be given a strong voice in the design and content of vocational qualifications through Sector Skills Councils. Sector Skills Agreements between employers will set out learning needs, commit employers to collaborative action, and ensure that public funds respond directly to employer priorities.

The government see the SSAs as having enormous potential power in bringing employers together to decide their priorities for collective action, and how they can best support higher productivity. Agreements will set out both the funding contributions that employers are prepared to make themselves and the priorities for shaping the allocation of public funds with the respective funding councils.

The government has emphasised two particular aspects. First, it must be easier for people to climb up the skills ladder, in steps to suit their talents and motivation, from the basics of literacy, language and numeracy through to higher education. Each step in that ladder must equip young people and adults with the skills for employability and give them recognition through qualifications for what they achieve. Second, IAG must be widely available for all adults who want it, to help them make sense of what is on offer, and the best way of linking skills, learning and jobs.

2.2.4. Agenda for Change

The Learning and Skills Council[6] sets out proposals to:

- Create a nationwide network of colleges – and other providers – focused on the needs of employers.

- Develop with employers a Quality Mark for those colleges – and other providers – so that employers know they meet exacting standards and that the services they provide will be of high quality and responsive to the real needs of their organisations.

- Increasingly make employers aware of the benefits of working with these quality-marked colleges – and other providers – so funding flows accordingly in line with employer choice.

- Develop the National Employer Training Programme (NETP) as a powerful, demand-led mechanism for changing the way in which training for adults is delivered. (As set out in the Skills White Paper of March 2005).

2.2.5. Regional Development Agencies

Within England each of the Regional Development Agencies (RDAs) has five statutory purposes[7], which include:

- Further economic development and regeneration.
- Promote business efficiency, investment and competitiveness.
- Promote employment.
- Enhance development and application of skill relevant to employment.
- Contribute to sustainable development.

[6] Agenda for Change, LSC, August 2005.
[7] Pera, July 2007, Bioscience Regional Activity and Profile – unpublished report prepared for SEMTA.

Each RDA's agenda includes regeneration, taking forward regional competitiveness, taking a lead on inward investment and, working with regional partners, ensuring the development of a skills action plan to ensure that the skills training available matches the needs of the labour market and to this end, each RDA has developed Regional Skills Partnerships.

Each region has a Regional Economic Strategy and, within it, sectors and clusters that it seeks to promote as a priority. There are a number of regional organisations that support these clusters and sectors within each region.

Table 2.1 below summarises the regional sector clusters and priorities related to the Semta sector and MME.

Table 2.1: Regional priority sectors

Region	Priority sector
North West	Aerospace, engineering/technology, future work is planned in environmental technologies and automotive.
Yorkshire & the Humber	Advanced engineering and manufacturing, electronics.
North East	High and low volume manufacturing and process industries
West Midlands	Automotive, aerospace and manufacturing
East Midlands	Engineering
East of England	The automotive industry, high technology, research and development.
South West	Advanced engineering including Aerospace and Marine
South East	Marine Technology advanced engineering technologies linked to motor sport and the R & D cluster.
London	Manufacturing.

2.3. Policy context in Northern Ireland

2.3.1. The Skills Strategy for Northern Ireland

The Skills Strategy for Northern Ireland[8] is a Department for Employment and Learning initiative, the draft of which was launched in 2004. Its key aims are to raise the overall skills level in Northern Ireland and to address the high economic inactivity. Whilst unemployment has reached a record low (4.7%) economic inactivity in Northern Ireland has remained between 27-30% since the mid 1980s.

The Skills Strategy aims to help individuals progress up the 'skills ladder' improving the overall skills level in the process; improve the employability and skills of those excluded from the labour force, particularly through the Welfare to Work initiative; and to ensure high productivity and competitiveness to secure Northern Ireland's position in the global marketplace.

The Skills Strategy identified three groups of skills:

- Essential skills: Literacy, numeracy and, increasingly, ICT.
- Employability skills: such as team working, problem solving, and flexibility.
- Work-based skills: employer-specific skills.

The strategy recognises the key role SSCs can play in addressing the major skills concerns of individual sectors. SSCs must increase employer engagement by developing local representation and networking arrangements.

2.3.2. Economic Vision of Northern Ireland

The Economic Vision of Northern Ireland set out the country's long-term economic objectives as well as incorporating related social welfare issues. The aim of the Vision is to make Northern Ireland more productive and internationally competitive. Key areas of focus include the creation of higher value-added jobs and increased adult learning and training.

The Skills Strategy for Northern Ireland Implementation Programme[9] addressed four themes underpinning the Economic Vision:

- Understanding the demand for skills.
- Improving the skills level of the workforce.
- Improving the quality and the relevance of education and training.
- Tackling the skills barriers to employment and employability.

The Vision also identified the need for an increase in the level of investment in R&D, which is lower in Northern Ireland than in the rest of the UK, and is combined with focus on enterprise and innovation. These skills seem to be missing from the working culture and thus need to be encouraged in order to improve performance.

[8] DELNI (2004) Success Through Skills: the Skills Strategy for Northern Ireland
[9] DELNI (2006) Success Through Skills: the Skills Strategy for Northern Ireland – A Programme for Implementation

In a progress report published in May 2007[10], jobs in the services and construction industries are described as having grown at a high rate in Northern Ireland. Although manufacturing as a whole has declined, most of this fall in the past decade can be attributed to sharply reducing numbers on the textile/clothing industries whereas other sectors such as manufacture of metal products have grown.

2.3.3. Invest NI

Invest NI have a number of programmes which aim to support investment in research and development, some of the following are particularly relevant to employers in the MME sectors.

Invest NI have two programmes focussing on support for industrially relevant research and development activities. These are 'The Start programme,' offering financial assistance for industrial research to businesses either alone or working with Northern Ireland Universities and Foresight NI, a programme designed to help local industry increase the exploitation of emerging science and technologies.

Groups of programmes are available for businesses in near-market product and process developments aimed at helping businesses reach their customers through advice, equipment and facilities and financial support. The CE Marking programme is designed to help businesses manufacturing machinery, electrical or electro-mechanical equipment for export to Europe. The Product and Process development programme is designed to help businesses develop innovative products and processes, covering specialist advice and financial assistance.

The Higher Education Innovation Fund is designed to foster research, development, and tech transfer within academia by assisting universities to reach out to businesses and to capture and exploit intellectual property.

The Proof of Concept programme provides financial support for university researchers in the pre-commercialisation of leading-edge technology.

The NITech Fund offers similar support for financing the commercialisation of research and development in businesses.

The business support offered by Invest Northern Ireland is complemented by a number of initiatives that support specific sectors that are important to the Northern Ireland economy. These sectors include aerospace, electronics and engineering.

The aerospace sector in Northern Ireland has major links to US and European Aerospace companies such as Boeing, Airbus, Bombadier and their supply chains[11]. Invest Northern Ireland have four key strategic goals for this sector:

- To develop an accurate undertaking of capability and skills.
- To develop collaborative relationships.
- Focused market strategy on key supply chains.
- To develop value added to ensure local companies ca move up the supply chain.

[10] DELNI (2007) Success through skills progress report May 2007
[11] Invest Northern Ireland Aerospace Sector Profile (2007)

Invest NI also have a regional partnership with the 21st Century supply chains (SC21) a change programme designed to accelerate the competitiveness of the aerospace & defence industry by raising the performance of its supply chains.

2.3.4. Key future priority technologies

The Department of Enterprise, Trade and Investment (DETI) has also identified five 'key future priority technologies' in the Regional Innovation Strategy Action Plan[12], one of which is Aerospace Technologies, an area that is of relevance to the MME supply chain industries. It is in these priority technologies that resources will be concentrated:

- Information & Communication Technologies
- Life Sciences (encompassing Biotechnology)
- Aerospace Technologies
- Nanotechnologies
- Agri-food Technologies

2.3.5. The Essential Skills for Living Strategy and Action Plan for Adult Literacy

The Essential Skills for Living Strategy and Action Plan for Adult Literacy were launched in October 2002 with the aim of improving the levels of literacy and numeracy. The Strategy was a response to the findings of the International Adult Literacy Survey 1996[13] that 24% of the adult population had basic skills deficiencies, a figure supported by the Labour Force Survey 2003. A pilot scheme now includes ICT as an essential skill.

The DEL has identified six priority skill areas and recruitment has increased by almost half, encouraged by targeted funding initiatives. These are areas with serious identified skill shortages – construction, ICT, manufacturing engineering, electronics, software engineering, and tourism and hospitality.

The Department has also launched an English Speakers of Other Languages initiative in response to the growing number of migrant workers in Northern Ireland. As well as working in jobs that domestic workers reject because of low wages or unattractiveness, they are often filling a genuine skills gap.

Northern Ireland has its own regulatory and examination body for work and colleges, the Council for Curriculum, Examination and Assessment, although the four UK nations have a joint body for standards setting, the UK Co-ordinating Group. Northern Ireland also has its own system of equal opportunities legislation implemented by the Equality Commission for Northern Ireland.

The Engineering Training Council NI (ETC), under agreement and on behalf of Semta, operates as the Sector Skills Council in Northern Ireland.

[12] Department of Enterprise, Trade and Investment (March 2006) The Regional Innovation Strategy for Northern Ireland: Action plan, Sept 2004 to August 2006.
[13] Northern Ireland Statistics and Research Agency (NISRA) (1996) *International Adult Literacy Survey*

2.3.6. Metals and Machinery manufacture in Northern Ireland.

A report published in August 2007[14] presented findings of research on meeting employers' skills upgrading needs through engagement with Further Education (FE) and commercial vocational education and training (VET) providers in Scotland and Northern Ireland. The report provides an overview of employment in metals and machinery manufacture in Northern Ireland with approximately 7,750 people employed in the manufacture of metals and metal products and a further 6,000 people employed in the manufacture of machinery and equipment. The Inter-Departmental Business Register data suggest that there are 35 establishments involved in the manufacture of basic metals; a further 730 involved in the manufacture of fabricated metal products; and 395 involved in the manufacture of other machinery and equipment. Across these three areas of activity, just over half of all establishments employ less than five members of staff. Northern Ireland's main centres of metal manufacturing activity are located in the urban centres of Belfast and Lisburn, although there are a number of other clusters in regions such as Dungannon, approximately 65km from Belfast.

2.4. Policy context in Scotland

2.4.1. The Framework for Economic Development in Scotland

The Scottish Executive set out the overall policy for the economy in the Framework for Economic Development in Scotland (FEDS) with the aim of raising the quality of life of the Scottish people through increasing the economic opportunities for all on a socially and environmentally sustainable basis[15]. This can be affected by a number of factors, including: education and skills; the physical infrastructure; entrepreneurial drive; the competitiveness of enterprises; and the management of public finances.

The four outcome objectives of the FEDS are:

- Economic growth - With growth sustained and accelerated through greater competitiveness in the global economy.
- Regional development - With all regions enjoying the same economic opportunities and regional development contributing to national economic prosperity.
- Closing opportunity gap - Enhanced economic opportunities for all in society, with social development contributing to national economic prosperity.
- Sustainable development - In terms of the economic, social and environment.

[14] Skills Upgrading Needs: The Challenge for Employers and Training Providers in Scotland and Northern Ireland - Research Report 26 (August 2007)

[15] The Framework for Economic Development in Scotland, Scottish Executive, 2004.

2.4.2. The Scottish Government Economic Strategy[16]

The Government Economic Strategy supports the delivery of the Purpose, that is, to focus the Government and public services on creating a more successful country, with opportunities for all of Scotland to flourish, through increasing sustainable growth. This document was published in November 2007 and the strategic priorities identified are as follows:

- Learning, Skills and Well-being - With a focus on education, skills, health and well-being for people in Scotland.
- Supportive Business Environment - With focus on enterprise support to increase the number of successful businesses, targeted business support, a broad approach to business innovation and strengthening the link between Scotland's research base and business innovation.
- Infrastructure Development and Place - Improving connections and investment across Scotland to improve reliability and journey times in order to maximise opportunities for business and employment.
- Effective Government - Streamlining the Scottish Government's direct dealings with business and more effective government with a clear focus on achieving higher levels of sustainable economic growth.
- Equity - Providing opportunities and incentives for all to contribute to Scotland's sustainable economic growth as well as promoting economic growth and environmental quality in a way that is mutually advancing.

2.4.3. A Smart, Successful Scotland

Smart, Successful Scotland, published in January 2001, aims for an ambitious, confident Scotland where the benefits of a strong, dynamic economy are shared across all communities[17]. It is the Scottish Executive's strategic direction for the Enterprise Networks, building on the objectives identified in FEDS.

To meet the aims set out in SSS, Scotland needs to:

- Create a suitable environment for high growth sectors.
- Achieve maximum impact in sectors that show a competitive advantage, such as financial services, energy, and food and drink.
- Ensure that sectors important to local economies successfully transform to meet the challenge of changing trading conditions both locally and globally.

Three organising themes are identified in the document, these are:

- Growing businesses.
- Skills and Learning.
- Global connections.

[16] Scottish Government 2007a Economic Strategy

[17] Scottish Executive, 2004a. 'A Smart Successful Scotland, Strategic direction to the Enterprise Networks and an enterprise strategy for Scotland'

2.4.4. Growing businesses

Challenges for growing businesses are to drive up the rates of business start ups and increase the innovation within established businesses. The Scottish Executive (2004) recognise that increasing business starts will not have a large effect on overall productivity and therefore levels of ambition and management capability are key areas for development. Access to finance, especially where businesses are R&D intensive and business support were also identified.

Support identified to address these challenges is the education system, especially with respect to supporting creativity and entrepreneurship and the Scottish manufacturing advisory service[18]. The Scottish manufacturing advisory service offers assistance to SME managers in accessing specialist advice to help improve competitiveness in the global market such as lean production. The Scottish Co-investment fund has also been established by Scottish Enterprise[19] to increase the risk capital available for investment opportunities in companies in approved business sectors and with up to 250 employees. Eligible industry sectors include technology, electronics and manufacturing.

The challenge of exploiting knowledge and building links between Universities and commercial applications in business is recognised as requiring close co-operation and support to improve such development includes the Enterprise Networks that can provide financial support toward business R&D.

2.4.5. Skills and Learning

For skills and learning, challenges such as improving lifelong learning and the development of business leadership and management skills are identified as being crucial to business success. Working with sector skills councils, Careers Scotland, Futureskills Scotland and JobCentre Plus is recognised as being effective support to assist in identifying and addressing skills gaps in particular industries.
The Scottish Executive (2004) describe the record of getting people into apprenticeships, college and university in Scotland as successful although it recognises that investment in training is variable and not always aligned with business objectives.

2.4.6. Global connections

The need to develop more international collaborations and partnerships is recognised and the Scottish Executive (2004) are keen that companies from outside Scotland locate here, especially where they generate high value jobs. The need to attract and retain talent is also recognised, an ageing and falling population as well as continued migration are challenges to the success of the economic development. Supporting activities to meet these challenges include the Fresh Talent initiative, the Enterprise Networks and efforts to make Scotland an attractive place to work and carry out business.

[18] SMAS was established in 2005 and is funded by Scottish government and the European Development fund. Services are delivered via the Business Gateway in partnership with Highlands and Islands Enterprise
[19] Scottish enterprise website http://www.scottish-enterprise.com

2.4.7. Education and Training

National Priorities in Education was published in December 2002. The report focused on improving achievement and attainment in schools and developing a culture of lifelong learning. It also identified a need to teach "soft" skills in schools. The strategy promotes traditional academic skills above vocational education.

The New Approach to Entrepreneurship places a greater emphasis on the contribution of the education system and recommends that careers advice in schools include business creation as a possible option. Similar initiatives include:

- The Enterprise in Education initiative includes the provision of work-based vocational education from the age of fourteen.
- The Business Gateway provides a single point of contact for consistent and high quality business support.
- The Equity Investment package aims to address the equity gap facing small businesses.

The Fresh Talent Initiative is addressing Scotland's demographic trends and talent pool. Scotland has an ageing population- by 2022 it is estimated that 42% of the population will be over 50. The scheme aims to encourage and enable people to relocate to Scotland, allow international students to remain in Scotland for two years after graduation and boost the international element of Scottish life and the economy.

The Executive has responded by focusing on the need for retraining. Life Through learning; Learning Through Life is the lifelong learning strategy, setting out the objectives and delivery mechanisms of the Scottish Executive. Its aim is to find the best possible match between the learning opportunities open to people and the skills, knowledge, attitudes, and behaviours that will strengthen Scotland's economy and society[20].

The Scottish Government has recently published its new lifelong skills strategy[21] devised to show how all of the constituent parts of the education and learning systems in Scotland can contribute to giving Scotland a world class skills base The strategy recognises that it is vital to Scotland's economy to have a steady supply of workers skilled to higher levels. It describes the importance of a steady flow of graduates and technicians being vital in order that industries in which Scotland operates at the leading edge can continue to compete favourably with the modern knowledge economy being ever-increasingly reliant upon a steady supply of skilled scientists, technologists and engineers. The strategy also identifies the importance for Scotland to continue to increase technology transfer from its world class research base into viable products and processes through encouraging technology start-ups and helping them to grow into the large companies of the future.

2.4.8. The Sectoral Approach

SSCs can provide sound understanding of employer demand and shortages, through joint working with Futureskills Scotland. Currently the Scottish Executive is committed to Sector Skills Agreements with all SSCs.

[20] Life Through Learning; Learning Through Life, The Lifelong Learning Strategy for Scotland, February 2003.
[21] The Scottish Government Skills for Scotland (2007)

2.4.9. Created in Scotland

In August 2002, the Scottish Manufacturing Steering Group (SMSG) was convened to identify actions required to support manufacturing in Scotland. In March 2000, informed by the work of the original SMSG, a framework for support for the manufacturing sector across Scotland called 'Created in Scotland: The Way Forward for Scottish Manufacturing in the 21st Century' was published.[22] In the document the Scottish Executive states that they are committed to ensuring that manufacturing continues to play a significant role in the future of the Scottish economy, and to working with the UK Government to achieve this goal. Updates are published showing actions taken by the Scottish Executive with the last update in February 2003 although the SMSG are now disbanded.

2.4.10. Science Strategy for Scotland

A Science Strategy for Scotland was first published by the Scottish Executive in 2001; the coverage of the term 'science' refers to physical sciences, including engineering and technology as well as life and social sciences.

The long term aspirations described in the strategy update are as follows:[23]

Maintaining and connecting the science base

- Maintain excellence in the Scottish science and research base and retaining global competitiveness.
- Continue to promote Scotland as a "science nation": and world-class location for research and development, with international education and research links.
- Developing ability to identify new areas of scientific opportunity of strategic importance to Scotland's economy.
- Developing strategic investment in research to generate beneficial collaborations across the science base in Scotland and with overseas partners.
- Promoting awareness and appreciation of science across society.

Exploiting science to grow the economy and benefit society

- Maintain and develop pipeline of support for innovation and commercialisation of research from the science base.
- Place emphasis on the value of commercialising research, promoting a culture that fosters knowledge transfer from the science base.

[22] Scottish Executive (2000) Created in Scotland, The way Forward for Scottish Manufacturing in the 21st Century.
[23] Scottish Executive (2000a) 'A Science Strategy for Scotland 2001' (2000a)

Improving science education and promoting science careers

- Build, through A Curriculum for Excellence, a cycle of review of the curriculum to keep it updated, refreshed and relevant with the science curriculum remaining part of that review cycle.
- Ensure a good supply of science and mathematics teachers with provision to keep their skills and knowledge up to date.
- Ensure that there are suitable science and technology facilities in schools.
- Ensure that careers information provides a complete and up-to-date picture of the opportunities available to those who study science, based on career destinations.
- Inspire young people to consider the achievements of science, through a broad range of formal and informal science education providers, including the Science Centres.
- Ensure that publicly funded fellowship schemes are attractive and meet current needs.

Promoting awareness and appreciation of science across society

- Promote understanding, appreciation and engagement with science by all levels of society through informal science education.
- Link in to Science and Society activity at a UK and European level.

Developing better use of science and scientific advice by Government

- Continue to strengthen Scottish Executive structures to manage science and innovation policy.

2.5. Policy context in Wales

The Welsh Assembly Government aims to create a Wales where everyone has the skills, motivation and opportunity to obtain good quality jobs that meet their aspirations and abilities, and where employers work with their employees and public sector agencies to raise skills to the highest possible levels to support high quality jobs in a growing economy.

'Wales: a Better Country' is the Welsh Assembly Government's strategy for the whole country and aims to promote a diverse, competitive, high added-value economy with high quality skills and education that minimises the demand on the environment.

2.5.1. The Skills & Employment Action Plan

The Skills & Employment Action Plan for Wales (SEAP)[24] influences the delivery strategies of organisations such as the ELWa[25], HEFCW, Career Wales, and Jobcentre Plus. The Action Plan is key in implementing the Welsh Assembly Government's strategy. The Action Plan aims to:

- Improve mechanisms for workforce development.
- Supply new entrants with skills needed for employment.
- Work with employers and employees to improve skills.
- Help more people into sustained employment.

It also adheres to the European Employment Strategy objectives of full employment; improved quality and productivity at work; and strengthened social cohesion and inclusion.

Good progress has been made with the SEAP, published in 2002, and the number of hard-to-fill vacancies reported has halved since 1998.

2.5.2. The Skills Concordat

The Skills Concordat identifies the following priorities:

- Raise awareness of the need to improve skill levels.
- Strengthen efforts to overcome basic skills problems.
- Increase the take-up and relevance of vocational qualifications.
- Raise the quality of learning provision.
- Increase the take-up of IiP, particularly amongst SMES.
- Boost action to tackle skills shortages and gaps.

2.5.3. Education and Learning Wales

The ELWa's 'Developing the Workforce'[26] identified various priorities:

- Learning must provide employer-responsive provision.
- Greater bespoke provision for employers.
- Drive for quality.
- Improved learning products.
- Improved processes to deliver such training.
- Supported customised skills development for SMEs targeted at those demonstrating potential.

The ELWa recommended a review of vocational education and training to better meet the individual and employers' needs. It included the provision of vocational education from the age of 14 years and the re-launch of the Modern Apprenticeship programme.

[24] National Assembly for Wales (2005) Skills and Employment Action Plan for Wales 2005
[25] The activities of ELWa were transferred to the Welsh Assembly Government administration in 2006.
[26] ELWa, (2004) Developing the Workforce, Learning in and For the Workplace October 2004

2.5.4. Basic Skills

The Basic Skills Strategy was first published in 2001 and extended in 2005. It aims to improve basic numeracy and literacy – in English or Welsh – defined as Level 1 in the National Qualification Framework. Tuition for Basic Skills is provided free.

Wales suffers from high economic inactivity, caused in part by the collapse of the low skill industries and exacerbated by the high numbers of low skill workers. 53% of the working-age population in Wales are below Level 1 numeracy; 24% are below Level 1 literacy. Despite these figures only 13% of employers are aware of Basic Skills problems in their workforce.

The Wales Skills Task Force report in 2000[27] stated that Level 3 was the minimum level required by the Welsh workforce if they were to meet to the aims of the Welsh Assembly Government's economic development strategy, 'A Winning Wales'

2.5.5. Provision for Young People

Young people are entitled to education and training in Basic Skills, Key Skills, and Welsh language skills. Learning Pathways 14:19 instructs the strategic delivery of 14-19 education.

12% of 16-18-year-olds are not in education, employment or training (NEETs). In 2003-04, 62% of students in their final year of compulsory education failed to achieve three Cs or above in GCSE English, Welsh, Maths and Science.

Graduate Opportunities Wales (GO Wales) helps new graduates to find jobs, gain relevant work experience and develop their professional skills. Career Wales aims to encourage and improve work experience placements in Wales.

2.5.6. The Sectoral Approach

Sector Skills Councils must provide leadership for strategic targeted action in their sector and prepare the workforce development plan for implementation. SSCs are increasingly involved in preparing qualification strategies.

Ten priority sector fora have been identified: automotive; aerospace; agri-food; technology; pharmaceuticals and biochemistry; financial services; creative industries; construction; hospitality, leisure and tourism; and social care. These areas are recognised as being of particular importance and it is hoped that this approach will help to identify gaps and develop a coherent, strategic approach.

The supply chain for aerospace and automotive industries in the region will include MME companies. The Welsh Automotive forum acts as a voice for the automotive industry in Wales, performing a lobbying and influencing role with the Welsh Assembly Government and government funded bodies, to ensure that funding and support of the industry are focused, and match the needs of all players in the supply chain. The Aerospace Wales Forum is the voice of the Welsh aerospace industry and aims to build on the existing aerospace industrial base, to create an internationally recognised region of aerospace excellence and innovation.

[27] National Assembly for Wales (2000) Report of the Wales Skills Taskforce

2.5.7. Centres of excellence

There are a number Centres of Excellence in Wales including Centres of Excellence for Product Development with The National Centre for Product Design and Development Research[28] based at the University of Wales Institute Cardiff and The Manufacturing Engineering Centre (MEC)[29] based at Cardiff University. Both of these centres are able to offer MME employers specialist services for technology transfer, consultancy and research in specialist areas such as rapid prototyping, advanced CNC machining and design expertise.

2.5.8. Techniums

The Technium concept was initiated in response to targets set by the Welsh Assembly Government to drive forward enterprise and innovation in Wales.[30] Technium deliver against these targets in a number of key areas including the successful commercial exploitation of new ideas improving the climate for enterprise in Wales, and encouraging businesses in Wales to become more competitive by developing and adopting leading-edge technologies, product and process innovation.

Of the nine Techniums, the following have particular expertise to support MME employers, although all have particular areas of business and development specialisms.

- Technium Swansea - supports knowledge-based businesses across a range of sectors such as ICT, software, multi-media, electronics and engineering.

- Technium Sustainable Technologies - specialises in the areas of energy; renewables, power supplies and auto power train, electrical control technologies and materials, including high performance metals and alloys.

- Technium Performance Engineering - The primary focus of this Technium is the development of knowledge-based companies in performance engineering servicing the automotive, motorsport and/or aerospace sectors. This would involve component/module design and development, finite element analysis, modelling and simulation, electronics and telematics and/or fatigue and durability performance.

2.5.9. International Business Wales

International Business Wales is part of the Welsh assembly government aimed at assisting Welsh companies, or international businesses looking for trade partners in Wales. [31]

[28] The National Centre for Product Design and Development Research http://www.pdronline.co.uk/PDR/intro.htm
[29] Manufacturing Engineering Centre http://www.mec.cf.ac.uk/
[30] Technium Website http://www.technium.co.uk
[31] International Business Wales http://www.ibwales.com

3. The demand for skills

3.1. Sector profile

Based on the Annual Business Inquiry 2005 there are an estimated 800,000 employees and 55,000 establishments in the UK Metals, Mechanical and Electrical (MME) sectors[32]. The MME sectors represent 3% of total UK employment and 2% of total UK establishments. The UK MME sector represents 61% of total UK engineering employment and 76% of total engineering establishments.

The metal products sector accounts for half of all MME establishments and nearly half of total employment. Mechanical equipment makes up a third of total MME employment.

The majority of UK MME establishments are very small, with 94% employing fewer than 50 people. These small firms are vital to the MME sector nationally as they account for 45% of all MME jobs. Only 1% of establishments are large (250+ employees), yet they make up a quarter of total MME employment.

The West Midlands has the greatest concentration of employment across all MME sectors except electrical equipment where employment is concentrated in the South East (17%) and North West (11%). Wales has a greater proportion of basic metals employment when compared to employment in other MME sub-sectors in Wales.

The West Midlands has the greatest concentration of MME establishments (16%), followed by the South East (13%). The English regions account for 88% of total UK MME establishments. Northern Ireland (3%) and the North East (3%) have the smallest proportion of total UK MME establishments.

3.2. Workforce demographics

About 93% of employment within the UK MME sector work on a full time basis, compared with about 70% in the UK economy as a whole.

The UK MME workforce is heavily dominated by males. While 81% of the UK MME workforce is male, the respective proportion for the UK economy as a whole is about 56%.

The age profile of the MME workforce is an ageing one when compared to all sectors in the UK economy. 46% of the UK MME workforce is aged 45-64 compared with 39% in all sectors in the UK.

The three occupational groups of skilled trades (craft), managers and process, plant and machine operatives account for about 66% of employment in the sector.

[32] The Annual Business Inquiry figures on employment excludes those self employed and casual labour, so is likely to under-estimate the total number of people working in the sector.

3.3. Employment trends

The UK MME sector has experienced a period of major restructuring over the last two decades. Over the period 1984-2004 there has been a net loss of jobs about -577,000 (or -37%) across the UK MME sectors. However, this compares with an average net employment gain of 17% across all UK sectors.

Bespoke economic projections commissioned by Semta point to a forecast net decline in employment in all three MME sectors over the period 2005-2014. Measured in terms of annual rates of growth these vary from -1.0% in the case of mechanical equipment to -0.6% in relation to metals and -0.7% for electrical equipment.

The projections indicate that although a net decline in employment is likely in all MME sectors over the period 2005-2014, significant numbers of staff will be needed in all MME sectors in order to replace those who leave their jobs because of retirement or other reasons. The projections point to the need for about 296,000 employees within the UK MME sector as a whole over this period to replace employees leaving, implying a net requirement for labour over the period 2005-2014 of about 235,000.

In relation to each individual MME sector the projections point to a net requirement for labour of about 132,000 within the metals sector, 67,000 within mechanical equipment and over 36,000 within electrical equipment over the same period.

The most significant positive net requirements for labour are expected to be in relation to managerial occupations (an estimated 45,800 people) and skilled trades (an estimated 45,300 people). Even in the case of both skilled trades and process plant and machine operatives, although a net decline in overall numbers is expected, the scale of expected replacement demand exceeds this, implying a positive net requirement.

Direct feedback from employers via the Semta Labour Market Survey (LMS 2007) point to significant optimism in future employment prospects over the next 2-3 years. The analysis indicates that in relation to expected employment change over this period, a positive net balance of employment change is evident in relation to all occupational groups in the UK MME sector.

3.4. Competitiveness and productivity

The UK MME sector is very important to the economy with a turnover of over £117 billion, about 4.5% of total UK turnover.

Analysis of Gross Value Added (GVA) provides one measure of productivity. It is also an important indicator of economic prosperity. It measures the contribution to the economy of each individual producer, industry or sector. GVA per employee measures this as an average contribution per employee.[33]

[33] GVA is the difference between gross output and intermediate inputs. Gross outputs of a production unit or service during a given period is equal to the gross value of the goods and services produced during the period recorded at the moment they are produced, regardless of whether or not there is a change of ownership. Intermediate outputs refer to the value of goods and services used in the production process/service provided during the accounting period.

The MME sector accounts for nearly 5% of total UK GVA. The average GVA per employee for the UK MME sector was just over £45,300 in 2006, significantly higher than the figure for all UK sectors of just over £33,300.

The key strategies employed by the industries to maintain competitiveness include: promoting innovation and; improving business planning and processes. Benchmarking of productivity for the UK MME sector against key international competitors shows that the gap is closing slowly but significant skills upgrading needs to occur to reach best in class.

In 2005, R&D expenditure for the UK MME sector was £1.26 billion, equivalent to 12% of total manufacturing R&D expenditure. However, R&D expenditure by the UK MME sector as a whole was only 6% higher in 2005 than in 1997. This compares unfavourably with the all sectors average of a 40% increase in R&D spend over the same time period. Some MME sub-sectors do not compare well with other engineering sectors and the manufacturing sectors as a whole, in terms of expenditure on R&D as a percentage of sales (R&D intensity).

3.5. Skills issues

3.5.1. Key drivers of skills

MME employers highlighted the key drivers of skills change in their sector. In order of importance, these included:

- The introduction of new technologies or equipment.
- Development of new products and services.
- New legislative or regulatory requirements.
- Introduction of new working practices.

A slightly lower proportion of MME establishments are expecting skills to change in the next 2-3 years compared to the past 2-3 years (54% of establishments compared to 59% of establishments). Establishments in the electrical equipment sector are most likely to see a skills change in the next 2-3 years due to all of the drivers listed and wholesale metals and scrap the least change.

31% of MME establishments had seen no real skills change over the last 2-3 years and did not expect any skills change over the next 2-3 years. This perceived lack of skills change ranged from 37% of micro MME establishments to only 15% of large MME establishments.

3.5.2. Current skills and qualifications

A relatively high proportion of those working in the UK MME sector have no qualifications. An estimated 12% of the UK MME workforce has no qualifications (121,600), which compares with an average of 10% across all UK sectors. This figure increases to 14% within the metals sector.

A lower proportion of those working in the UK MME sector (22%) have attained S/NVQ Level 4 and above compared to the average for all UK sectors (32%). This figure decreases to 17% within the metals sector. By contrast, the proportion of those working in the electrical equipment sector that have attained S/NVQ Level 4 or above is 29%. However, this is still below the average for all UK sectors.

The above analysis clearly underlines the need for continued upskilling within the UK MME sector.

3.5.3. Recruitment

Half of all UK MME establishments recruited in the previous 12 months. It is estimated that just over 62,000 people were recruited in the last 12 months, representing 7.5% of total employment.

Of those MME establishments that recruited, 10% recruited a recent graduate, 40% recruited a worker aged over 45 years old and just over half recruited a young person (aged 16-24 years old). Nearly half of large MME establishments recruited graduates.

17% of all UK MME establishments reported hard to fill vacancies and it is estimated that these establishments had over 13,000 hard to fill vacancies in total. When taking into account the lost GVA per employee related to these 13,000 hard to fill vacancies, it is estimated that the total GVA loss to the UK economy would be in the region of £570 million.

Hard to fill vacancies vary by MME sector and sub-sector. While 20% of mechanical equipment establishments reported hard to fill vacancies, the figure for electrical equipment was 14% and only 6% for wholesale metals and scrap establishments.

Amongst those UK MME establishments reporting hard to fill vacancies, the most frequently cited occupational groups were skilled trades (46% of such establishments), process plant and machine operatives (26%), professionals (11%), technicians (9%) and managerial staff (8%).

Hard to fill vacancies were mainly due to a lack of applicants with required qualifications and skills, a lack of applicants with required work experience and a general lack of applicants.

Specific skills lacking in applicants included experience (21% of those establishments with hard to fill vacancies), job specific skills (7%), specific qualifications (7%), welding (4%), basic skills (3%) and CNC machine operation (3%).

Employers with a general lack of applicants felt that this mainly due to not many applicants, poor image of sector and that there were only a few people left in trade/ small pool of skilled workers.

Nearly half of those employers with recruitment difficulties had to increase their recruitment efforts. Other remedies included retraining existing staff, subcontracting work and starting to look at foreign applicants/overseas.

Although nearly a third of MME establishments felt that recruitment difficulties would have no or little effect on their business, other establishments were suffering from a loss of business orders, increased work in progress, restrictions to business development and missed deadlines. All of these factors will have a negative impact on productivity and ultimately profitability of MME establishments.

3.5.4. Skills gaps

20% of UK MME establishments reported a gap between the skills of their current workforce and the skills required to deliver their business objectives in 2007.

The incidence of reported skill gaps ranges from 23% of mechanical equipment establishments to 18% of electrical equipment establishments. Within the metals sector much wider differences are evident, ranging from 23% of metal products establishments reporting skill gaps to 13% of wholesale metal and scrap establishments.

Skills gaps occurred across all size of MME establishment, ranging from a fifth of micro establishments to nearly half of large establishments.

The main skills cited as lacking in employees were technical and engineering skills at all levels (70% of those UK MME establishments reporting skill gaps).

The most frequently cited technical and engineering skill cited as deficient was CNC machine operation (13% of UK MME establishments reporting skill gaps). Other technical skill gaps reported by at least 2% of such establishments were:

- Tool Setting
- Welding skills
- General engineering skills
- Fabrication
- Metal workers
- General machining
- Computer Aided Design (CAD)
- Assembly line/ production robotics
- Materials Requirement Planning (MRP11)
- Computer Aided Manufacture (CAM)
- Computer Aided Engineering (CAE)

The main generic skills that were lacking were key or core personal skills (10% of those UK MME establishments reporting skill gaps), management skills (5%), IT/computer skills (5%) and marketing or selling skills (3%).

MME establishments were asked to identify those occupations with skill gaps that would have the most significant effect on their business and these included craftspersons (24% of such establishments), professionals (20%) and technicians (19%).

Table 3.1 provides a summary of key skills and workforce employment indicators.

Table 3.1: Summary of skills and workforce employment indicators for the UK

	% workforce that are female	% workforce aged 45+	% workforce that are Non-White	Gross Value Added per employee	% change in employment 1984-2004	Projected annual average % growth rate in employment 2005-2014	Projected net requirement 2005-2014	Projected annual net requirement 2005-2014	% workforce with highest qualification S/NVQ Level 4 or above	% workforce with no qualifications	% establishments reporting hard to fill vacancies over the last 12 months	% establishments reporting skill gaps over the last 12 months
Metals	18%	49%	4%	£44,510	-38%	-0.6%	131,600	14,600	17%	14%	16%	20%
Mechanical Equipment	19%	45%	5%	£47,300	-39%	-1.0%	67,000	7,400	24%	12%	20%	23%
Electrical Equipment	26%	43%	5%	£44,160	-33%	-0.7%	36,700	4,100	29%	9%	14%	18%
MME	19%	46%	5%	£45,370	-37%	-0.7%	235,300	26,100	22%	12%	17%	20%
All sectors	44%	39%	8%	£33,340	+17%	+0.7%			32%	10%		

Sources: Annual Population Survey 2006, ABI 2006, Semta LMS Survey 2007, Semta/IER employment projections 2007

4. An assessment of current learning provision

4.1. Background

Stage 2 of the Sector Skills Agreement (SSA) assesses the current provision of education, training and workforce development activity relevant to the Sector's requirements identified through Stage 1 - the Skills Needs Assessment.

The main purpose of this report is to set out the results of a comprehensive research programme which has sought to assess the current provision for skill needs in the Semta Metals, Mechanical Equipment and Electrical Equipment (MME) sectors, in order to highlight those issues of particular relevance to the UK.

4.2. Mapping provision

Employers in the MME sectors draw on people from a variety of educational backgrounds for their recruits, and make significant investments into the training and development of their workforces.

As with all labour markets it is important to take into account that not all recruitment is 'fresh from' publicly-funded *education* or training provision. Employers understandably seek as much relevant experience as possible in those they consider taking on, so that much recruitment is of people in their twenties, thirties and beyond, for which current provision institutional structures and qualifications are not necessarily so relevant. However, it is natural for policy analysis to focus on assessment of current provision, with a will to explore refinements to today's arrangements and practices that could improve the relevance of what is learned to employer needs, and so raise the value to employers of those coming out of the massive UK learning infrastructure that consumes very large amounts of taxpayers' money.

There are a wide range of publicly-funded courses of relevance to the skill needs of the MME sectors beyond secondary education, and – although many traditional boundaries are being adjusted through innovative approaches – these can be broadly divided into ***Higher Education*** and ***Vocational Education and Training***.

As the numbers of young people going into universities has grown, and the complexity and sophistication of technological development has risen over recent decades, it is natural that MME employers, like those in most other sectors of the UK economy, have generally recruited more young people with Higher Education qualifications. Overall, however, the evidence gathered for this report suggests that the MME sectors do not recruit particularly high numbers of graduates from courses of direct relevance to the (technical) skills used in their business. Work in the MME sectors might be viewed as representing some of the more traditional fields of engineering. However, as generally in a dynamic economy with growing international competition, UK enterprises in these sectors must continue to innovate in order to survive and prosper. The presence of leading-edge technical skills and insights that tend to come from those who have benefitted from Higher Education are as likely to prove as strategically important here as elsewhere.

Nevertheless, learning pathways through Vocational Education and Training provision remain of considerable importance for the MME sectors, and this includes Further Education and Work Based Learning. However, the major changes in market practices over recent years, not least the outsourcing trend, has affected many of the traditional company practices with respect to Human Resource Development (HRD) in particular the scale of previous apprenticeship programmes. This underlines the importance of finding approaches to HRD at different levels that 'fit well' within today's competitive marketplace & make best use of the available public investment.

4.3. The uptake and assessment of provision in Higher Education

The main Higher Education courses of potentially direct relevance to the technical skill needs of the MME sectors are:

- General Engineering;
- Mechanical Engineering;
- Electrical and Electronic Engineering, and
- Production and Manufacturing Engineering.

In addition, Materials Science and Metallurgy courses are of potential relevance, in particular to the Metals sector, although numbers taking these are considerably smaller.

In terms of Higher Education provision and uptake the latest figures show that 16,700 students enrolled on First Degree courses in engineering subjects relevant for the MME sectors. 39% of these were in electronic and electrical engineering, 33% in mechanical engineering, 22% in general engineering and 6% in production and manufacturing engineering. First destinations data show that most engineering graduates do not go into engineering sectors, and this also applies to graduates from MME-relevant courses and the MME engineering sectors.

In general, the picture of the flows of students into, through and out of Higher Education in these technical subjects is not particularly encouraging. There are falls over recent years in the numbers of graduates in both electrical/electronic engineering and particularly production/manufacturing engineering, though flows of new graduates in mechanical and general engineering increased slightly from 2003 to 2006. More worryingly for the future, First Degree enrolments in these engineering courses have fallen over recent years, except for mechanical engineering, as have student numbers on 'other undergraduate qualification' courses (including HNDs), with the minor exception of a slight rise from 2003 to 2004 in mechanical and electrical/electronic engineering.

While these trends are worrying in relation to UK engineering as a whole (and not unique to the UK), what is most relevant to the MME sectors is the trends in the numbers of graduates from these courses that are going directly into employment in the sectors.

- Over 500 **First Degree** graduates enter the MME sectors each year from courses in the four key types of engineering. The flows are relatively steady, although there is a small reduction in numbers coming from electrical and electronic engineering courses, and a certain growth in numbers from mechanical engineering – in which the largest numbers were educated (over 200 per year).

- A more significant trend is evident in the numbers of those who leave HE with **other Undergraduate** qualifications (including in particular HNCs, HNDs and Foundation Degrees) in the four most relevant types of Engineering. The total numbers of these has fallen from nearly 250 to some 150 in the last three years. This fall has occurred in all four disciplines, although numbers of Mechanical Engineering leavers have leveled out, and 2005/6 showed a small increase in flows into the MME Sectors.

- The third element of flows into the Sectors comes from **Postgraduate** courses in the key Engineering disciplines. The majority of these are likely to be taught Masters courses. Between 70 and 90 people with such qualifications enter the Sectors each year, and 2005/6 showed a fall, following growth in the previous two years. The contribution of flows from the four Engineering disciplines show greater variation over time, with Electronic and Electrical Engineering numbers growing and then falling sharply, and General Engineering playing an increasing role. In principle, these flows are likely to be particularly important in relation to influencing innovation in the sector, as Postgraduate courses generally enable students to focus more thoroughly on the 'leading edge' technologies that can enable innovation within the industry.

However, while falls in these numbers might appear at first sight to be worrying, it is necessary to clarify whether the flows are determined by (any limits on) supply or demand. Given that the numbers of these graduates entering the MME sectors represent a very small fraction of those graduating in the subjects, there is no evidence of there being any obvious constraint on the supply of such people. This suggests that – to the extent that recruitment of increasing numbers of graduates and postgraduates is strategically important in relation to stimulating innovation - the challenge is likely to be of raising employer demand for such skills, unless work in the sectors is particularly unattractive to these graduates.

International comparisons of enrolments and graduations in relevant university subjects do not suggest any uniquely British problem arising from the falling interest of young people in engineering.

4.4. VET Provision

Evidence on supply from Vocational Education and Training Provision also flags some concerns and opportunities for improvement.

There are a number of qualification types relevant to, and pathways into, work in the MME sectors.

National and Scottish Vocational Qualifications:

- These awards, based on the National Occupations Standards developed by Employers, are competence-based and involve very thorough assessment well beyond the testing of knowledge through written examinations.

- The most significant technical N/SVQs (for which Semta led the design) are:
  - Engineering Production, at NVQ Levels 2 & 3
  - Engineering Maintenance, at Levels 2 & 3
  - Performing Engineering Operations (PEO) at Levels 1 & 2
  - Performing Manufacturing Operations (PMO) at Levels 1 & 2
  - Engineering Management at Level 4

- In addition Semta has developed an N/SVQ that assesses competence in handling Quality Management – in particular Lean Manufacturing – for improved Business Efficiency: the Business Improvement Techniques (B-IT) qualification. This is available at Levels 2, 3 and 4, and has been very favourably received in the marketplace.

- Data on Registrations (entry) and Certifications (achievement) for the most significant ones confirm that:

  - Strong growth from 2002 in take up of the N/SVQ in Performing Engineering Operations (PEO) at Level 1, with less interest over recent years in the Performing Manufacturing Operations (PMO) qualification;

  - At Level 2, PEO N/SVQ registrations and certifications have also grown strongly, while PMO N/SVQ registrations have recently eased from a sound base. Registrations and certifications of Engineering Production have faded into insignificance as the qualification has been superseded by PEO/PMO. B-IT registrations grew strongly from 2004, and certifications are on the increase.

  - At Level 3 certifications of the Engineering Production N/SVQ have declined over recent year (take up of the qualification was valuable for 6-7 years). Certifications of Engineering Maintenance are continuing to be steady.

  - As is generally the case in most sectors, overall take up of N/VQs at the higher levels is disappointing: however the trend at Level 4 is upwards for B-IT and Engineering Management, albeit from a low base.

4.4.1. Apprenticeships

The proportion of company sites[34] that have apprentices or other recognised trainees in the MME sectors is similar to that in engineering as a whole. However, the fraction of sites with apprentices has fallen from 28% in 2002 to 25% in 2007.

Employer establishments in North East England, Northern Ireland and Scotland are most likely to employ apprentices, whereas in the West Midlands only 15% of MME sites had apprentices (the lowest of any region except for London). This seems surprising given the importance of the West Midlands in terms of employment and number of workplaces in the MME sector.

[34] each ***company*** ('enterprise'/'employer') may have one or more ***establishments***, each of which may have more than one site (or 'workplace')

The main occupations where apprentices are employed are at craft level (35% of apprentices) and technician level (33%). On average, apprentices account for about 4% of employment in the MME sector, the same as for all engineering. It is estimated that there are over 17,000 apprentices or recognised trainees in the MME sector at any one time.

Learning and Skills Council (LSC) figures indicate that there are some 27,000 apprentices in training in England and Wales in engineering and it is intended that this number will double by 2013, in response to the aspirations of the Leitch review of Skills[35].

- Metals Industry Advanced Apprenticeship - There was very strong growth in the percentage of apprentices achieving the outcome between 2004-5 and 2005-6, with over 70% success rate being maintained – for both the NVQ and the whole framework – into 2006-7.

- Engineering Apprenticeship - Progress over recent years has been steady for the Apprenticeship achievement rate, rising from some 40% for NVQ achievement in 2002-3 to over 70% in 2006-7, and a similar rise (from under 30% to over 60%) for achievement of the whole framework.

- Engineering Advanced Apprenticeship - After a fall from 2002-3 to 2003-4, performance for the Advanced Apprenticeship in Engineering has risen encouragingly, with both NVQ and whole framework success rates around 70%.

- The Industrial Applications Apprenticeship - Progress in achievements in this framework has also been good over the last four years, with particularly strong growth from 2003-4 to 2004-5 and 2005-6/ 2006-7.

4.5. Secondary Education

The seeds for young people's career choices are sewn in the secondary schools, and engineering careers generally need to be based on a more rigorous and technical set of subjects taken at GCSE and GCE 'A' Level and equivalent. In particular, flows of young people chosing science and technology-oriented subjects are the major source of people taking engineering-related HE and VET.

Certain trends here are also discouraging:

While numbers passing GCSE in Physics, Mathematics and the Science single award, as well as in Applied Science, have been growing healthily over recent years, numbers achieving GCSEs in Design and Technology, Science Double award, Engineering and Manufacturing have all fallen. The fraction of passes with the best grades (A*-C) has grown for nearly all relevant subjects.

[35] Her Majesty's Treasury (2006): 'Prosperity for all in the Global Economy: World Class Skills'

At GCE ‘A’ Level, there are also issues about the trend. Passes in Mathematics and Further Mathematics have grown over recent years, but those in Physics and Technology Subjects have not. Again, the percentage of those achieving the award with A or B grades has also generally risen over recent years. This – together with the corresponding rise at GCSE – does raise a question about whether standards are being fully maintained. If they are, then this is encouraging for the emergence of ‘greater talent’ than in the past – increases in quality, even if not in quantity of young people with a relevant secondary education base.

Overall, in spite of a wide range of reforms to science teaching over recent years, the general fall in interest in science and technology subjects in Secondary School remains a real issue for engineering skills policy, though it is not unique to the United Kingdom.

4.6. Professional Engineering Qualifications

The Engineering Council (ECUK) maintains the UK national register of professional engineers and technicians. As at 31 December 2006 there were 35 professional engineering institutions licensed by ECUK to submit for registration those of their members who met the UK Standard for Professional Engineering Competence (UK-SPEC). To gain registration, individuals must demonstrate competence underwritten by education, training and responsible experience, as set out in UK-SPEC. Subject to licence, institution members can be entered in one of three categories on the register:

- Chartered Engineers (CEng),
- Incorporated Engineers (IEng), or
- Engineering Technicians (EngTech).

The key trends are as follows:

- The total number of registrations continues to decline having fallen 8.1% (21,500) over the last decade.

- The category of IEng has experienced the most significant decline, but both CEng and EngTech categories have experienced some stabilisation in numbers.

- Despite a decline in volume the category of CEng remains the largest and its share has grown three percentage points from 1997 to 2006.

- The increase in the proportion of female new registrants over the decade has been slow, even from a very low base.

- An ageing profile may store up some problems in the next ten years unless there is a significant rise in new registrations.

- The average age of registered engineers continues to increase.

4.7. Learning Provider Perspectives

A full assessment of learning provision cannot be made without some understanding of the situation of Providers themselves. While there may be issues with the quality of provision, the realities of provision, in particular in the public sector where funding and bureaucratic constraints can be significant, need to be understood. In addition, there is further analysis into how provision looks from both Vocational Education and Training and Higher Education provider perspectives.

70 Further Education and other ***Vocational Education and Training providers*** participated in Semta's Further Education Training Provision survey in October 2007. Over 80% of these offer provision in both mechanical and electrical equipment-related skills, with smaller fractions providing courses in basic metals and metals wholesale. Some two-thirds of these providers have at least 50 learners on courses related to one or more of the MME Sectors, and the total number of learners covered are over 14,000. Nearly 80% of respondents offer training to Apprentices or other recognised trainees (excluding graduates), and 44% provided training to other students/trainees aged 25 or over. The key trends in supply and demand for provision are:

- 41% of respondents expected demand to increase in the coming year;
- 24% of the provides surveyed had courses at risk due to falling demand;
- 46% had under-utilised spare capacity;
- 42% were unable to provide training that was in demand (barriers to increased capacity were reported as cost of equipment followed by a lack of experienced/qualified staff and lack of space); and
- 71% of the providers had drawn on LSC funding in the past 12 months, with 29% using European Social Fund (ESF) Funding.

Semta also carried out a survey of **Higher Education *providers*** in 2007. The survey was sent to universities across the four nations that offer courses related to the MME sectors. 16 Higher Education Institutions responded. Of these, 13 institutions offer courses relevant to the mechanical equipment sub-sector, 10 relevant to electrical equipment and five relevant to both basic metals and metal products.

- All but one institution has more than 50 students on these courses, four have between 200 and 500 and three over 500. Undergraduates make up at least 40% of students in every case and over 80% in half the institutions.

- The types of courses offered were mostly Mechanical Engineering (43 courses), Electrical and electronic engineering (42 courses) and Computer Aided Design and Computer Aided Manufacturing (CAD/CAM) (28 courses). Most courses were offered at NQF level 6 (BSc/BEng) or above. The majority of institutions also offered training/courses in; communication skills, problem solving, team working and IT user skills (e.g. MS Word). Comparatively few customer relations courses were offered.

4.8. Quality of provision

There are two separate components of quality issues with the provision of education and training for the MME Sectors:

- Direct Quality Assurance (QA) of provision 'in its own terms' – e.g. through inspections and various audit mechanisms;
- Relevance: Assessments of the usefulness and value to the two types of customer who make use of the provision: employers (who often pay for it) and the learners who attend the course(s)

The Semta review of Apprenticeship Frameworks in 2006 found that employer satisfaction was generally very high, although in some cases it was felt that contact between employers and training providers could be improved. The vast majority of Apprentices on these frameworks (70% or over) were employed at the start of their programmes. Employers were agreed that an initial sound Introduction to Engineering was the most valuable component of these apprenticeships, and for this reason confirmed the importance of the Performing Engineering Operations N/SVQ.

Semta carried out a review of employers' views on the comparatively new Young Apprenticeship programme in early 2006 and early 2007. 76% of respondents expressed themselves very satisfied and 54% were fairly satisfied. 23% of responding employers had already taken on Young Apprentices following completion of the programme, and another 32% were intending to do so. 76% of employers (more than in 2006) felt that the Young Apprentices had a good, or very good, chance of entering an Advanced Apprenticeship at the age of 16.

Overall, as elsewhere in engineering, apprenticeship programmes appear to be well respected by employers, so that the major boost to public investment in this area proposed by the Leitch review is recognised to be positive, and Semta will be playing an important part in that.

The very major growth in numbers of people entering universities over the last 15-20 years has inevitably produced pressures on the ability of Higher Education Institutions (HEIs) to deliver the same level of quality to more and more students. Quality issues in HE are the responsibility of the Quality Assurance Agency for Higher Education QAA, and it approaches this by a rolling Audit programme for both

Teaching and Research. The results of these audits are published, and this information strengthens the operation of the HE 'market' as the ranking of courses influences demand from the best applicants. Audits are largely carried out on a 'peer review' basis, and Employers' views of the comparative value of different degrees courses are generally influenced by things beyond the formal QA processes.

Two-year Foundation Degrees (FDs) are comparatively new, and their effectiveness as a shorter, more vocationally-oriented HE offering is being refined in the light of early experience. Employment engagement in Engineering FDs was investigated by the Engineering and Technology Board in 2007. This engagement is clearly crucial, given the fundamental aspiration behind these courses for strong relevance to employment. Both FD providers' (HEIs') and employers' perspectives were surveyed, and considerable variation in employer engagement levels was identified. It emerged that employers are not yet seeing enough clear benefit to them of such involvement. Employers were found to be more positive than providers that

Foundation Degrees are providing the necessary skills. Existing links between providers and employers were recognised to be valuable in ensuring adequate engagement. It was felt that providers need to take into account the needs of local employers as well as those nationally identified, and that providers need to show as much flexibility as possible. Overall, all parties agreed that employer engagement in FDs needed to be strengthened.

From time to time the National Learning and Skills Council carries out large-scale surveys of learners about their experience in Further Education. The fourth National Learner Satisfaction Survey, with over 40,000 students interviewed in 2007 (and before that in 2004) distilled a number of key findings about experience with courses at Further Education Colleges (FECs), sixth form colleges and Work Based Learning-delivered FE. Overall, satisfaction with the experience was mixed, with learners in Engineering, Technology and Manufacturing less likely to be very or extremely satisfied than learners in other areas. Engineering, Technology and Manufacturing learners (29%) were more likely than FE learners generally (15%) to cite concerns with providers as reasons for leaving courses. These findings for England suggest the need for serious commitment to improving the quality of engineering, technology and management courses. Experience with engineering FE in Northern Ireland[36] appears to be rather better, and reports on FE in Wales and Scotland are often encouraging.

And finally, employers themselves commission training for their own staff, and Semta's own surveys in 2007 (the Labour Market Survey (LMS) for all Engineering, and the Workforce Development Survey (WDS) for the MME sectors) gathered a wealth of evidence about the current situation and quality aspects of training provision. Employers used a range of 'external' learning providers in addition to their own training resources, including commercial training providers, equipment suppliers/vendors, employer associations/professional bodies, FE Colleges, and universities. Quality was assessed in terms of six main factors, and, after in-house provision, employers rated vendor training and employer associations best overall followed by commercial providers, with FE providers performing least well.

4.9. Employer Investment in Workforce Skills

Three significant Semta surveys[37] carried out in 2007 enable, with the cross-reference of relevant parts of the most recent National Employer Skills Survey (NESS 2005), sound insights into a range of aspects of employer training in the MME sectors, and their relationship with such aspects elsewhere in the economy.

In terms of training initiated by employers, overall activity across all engineering establishments is generally slightly lower than across all sectors in the economy. Training activity in the MME sectors is similar or slightly lower than for engineering as a whole. Where training activity is lower than in other areas of engineering, it is likely that this is related to the size distribution of the companies in the sector. Smaller companies tend to undertake less training than larger companies and micro-establishments (those with fewer than 10 employees) generally have much lower levels of training activity or formal business planning and HR training processes.

[36] SSDA (2007)

[37] Engineering Labour Market Survey ('LMS'), and two MME-sector Surveys – the Workforce Development Survey ('WDS)' and the Five Stage Model Pilot Survey.

On average, 28% of MME establishments had not trained their employees in the previous 12 months.

The surveys produce a considerable amount of additional detail:

- Employment of Apprentices: Generally, between 15% and 30% of the MME sector employers used apprentices, with metal products employing the highest fraction (27%) and wholesale metal and scrap the lowest (at 6%). As was to be expected, the larger the employer, the more likely to have apprenticeship programmes (7% for micro-enterprises (<10 staff) up to 59% for large companies - above 250 employees). Difficulties in recruiting apprentices were reported to arise from problems of attitude/willingness to work or (perceived) quality of the candidates (reported by 34% of employers), with the second most reported reason (22%) being general lack of skills for the job. Employers were asked what would encourage them to recruit apprentices in the coming years: a quarter responded that nothing would, a fifth felt they would consider it if the business workload increased (i.e. that there was demand for an apprentice), and 13% expressed interest if financial support were forthcoming.

- Other training-related activities: 46% of respondents provided work-placement, while 16% made school visits. 15% offered summer placements, while 12% offered industrial placements, and 11% of those responding provided materials for schools.

- Training plans, and related planning: Employers in the MME sectors are generally less likely to have a training plan (46%) than the average for the UK economy as a whole (55%). Within MME, few employers within metals (at 46%) than within mechanical or electrical Sectors have plans, although within the metals sector, basic metals achieved the 55% national average. As might be expected, the larger the employer, the more likely it is to have a training plan (the average ranges from 28% for micro-enterprises to 79% for large enterprises (250+ employees). The same patterns pertain to training budgets, with employers from MME sectors running several percentage points below the UK economy average.

- Training activity in the previous year: A quarter of MME establishments had offered both on- and off- the job training to their employees in the previous year. In addition, 19% more on the job (only) and a further 11% offered off-the-job training only. Only 45% of responding employers offered neither type of training. There was comparatively little variation between the different MME sectors on this, other than the fact that wholesale metals and scrap companies were most likely to offer neither type of training.

- Training commitment by occupation: Managers within MME companies were most likely to receive training (36%), followed by operators (31%) and admin/clerical occupations (27%). Fewer than a quarter of technicians and craftspersons received training, and only 9% of assemblers. Generally, there has been more on-the-job training than off-the-job except for managers, with craftspersons, operators and assemblers more than twice as likely to have on-the-job training.

- Training spend: Some two thirds of respondents to the WDS provided information on their training spend over the previous year. The total spend of respondents (183 sites) was just under £11 million. This figure is high due to one large company spending £7.3m on training – without this company the figures are just over £20,000 per company and nearly £250 per employee. The greatest proportion of respondents (14%) spent between £2,500 and £5,000 in the year. Across different sizes of employers, the distribution was as would be expected – the larger the employer, the larger the training spend. This per capita spend is slightly higher than the £214 per employee spent by MME companies in England from the National Employers' Skills Survey (£255 per employee for all sectors in England).

- Types of provider used: The WDS found that the greatest number of responding establishments (52%) used their own in-house training arrangements, followed by commercial training providers (43%), with FE providers third, used by 26% of respondents. The ranking was similar for the findings of the 'LMS', with 34% of respondents 'very likely' to use company in-house facilities, followed by commercial training providers (15% very likely), and vendor training third, with 13% of respondents very likely to use them.

- Barriers to training: A range of factors were cited as barriers to more training: the most significant were the cost of training (14% of respondents) and the lack of time availability (13%).

- Delivery methods: A range of different methods were used to deliver training, but the most popular to MME employers were in-company trainers (51%), external trainers (42%), followed by college/training centres (28%), and in-company workshops (25%).

- In-house training Programmes: 72% of respondents develop their own training solutions in-house. The content of training programmes and solutions developed in house are health and safety training (cited by nearly 8% of respondents), job-specific training (6% of respondents), followed by basic/induction training (4%). The most often cited reason for in-house training development was 'tailoring to our specific needs' (10% of respondents), and 'it's cheaper/more cost effective' (10%).

- Funding and Funding Mechanisms used: 25% of responding employers reported making use of funding from public sources to support training. The fraction varied a little by location, with 31% of companies in the North East drawing on this support, down to 12% in London. The fraction in Scotland and Wales was a little higher than in England and Northern Ireland. In total some 36% of sites had accessed external funding to help with the cost of training. The majority of this funding was accessed either for staff undertaking N/SVQs or apprenticeships.

4.10. Employer Commitment: perspectives structured around the MME SSG Five Stage Model

The evidence of typical training activity collected from 500 companies in two English Regions and Northern Ireland, Wales and Scotland shows the majority of companies surveyed (353 or 70%) within the Metals, Mechanical and Electrical sectors to be operating at stage 2 of the model – i.e. training to meet legislative requirements with managers seeing training as a cost rather than a benefit. Overall, 82% are operating at stage 2 or above with only 18% doing little or ad hoc training only.

Larger companies are generally at a higher stage of development. However, implementation of the typical training activity in the model appears to be less well defined in smaller companies with less than 50 employees.

213 (43%) of the MME sector businesses in the survey have implemented some form of process improvement training, with problem solving being the most popular process. However, take up of '5S'[38] and 'lean' manufacturing techniques feature significantly across all sizes of business.

The largest area for improvement in skills development within the MME sector is to advance businesses at stage 2 to stage 3 or better. The improvement action required by most stage 2 businesses is to develop training plans that assist in meeting business objectives; closely followed by developing supervisors / team leaders. Taken together, these two actions have the potential to move 70% of stage 2 businesses to stage 3.

The 5 Japanese S's Seiri, Seiton, Seiso, Seiketsu and Shitsuke can be roughly translated into English as Sift, Sort, Sweep, Sustain and Self-discipline and they describe the 5 stages of the '5S' process. They are regarded as the 5 pillars of the visual workplace. The 5S have a broad application, from complex manufacturing facilities right through to the simplest of clerical operations. They are now used world-wide to some degree or another in most large and medium sized organisations.[38]

5. Scenario planning and consultations

The scenario thinking was developed at a series of five workshops facilitated and led by the BERR Futurefocus team.

Futurefocus undertook the five workshops in the following locations:

England:	28th November 2007	Coventry
	19th December 2007	Barnsley
Northern Ireland:	4th December 2007	Belfast
Scotland:	14th December 2007	Glasgow
Wales:	6th December 2007	Cardiff

The workshops were designed to assist engaging with sector representatives in order to:

- Identify what is driving change.
- Identify the key trends in society the environment and technology that will impact the MME sectors.
- Prioritise the key trends in order of importance and uncertainty and consider the implications for supply and demand in the labour market and types of skills.
- Consider the key critical success factors for the sector and look at the implications of the trends for the critical success factors.
- Develop a positive and negative scenario.
- Identifying the key actions by employers, Higher Education, Further Education, Government and other stakeholders that the SSA would need to influence.

The scenario planning also contributed to the consultation on the Stage 1 Skills Needs Analysis, particularly on the key drivers of business competitiveness and their implications for demand for skills; future skills and priorities. It built on the issues identified by the SSG by considering how these are affected by various possible future developments and it therefore helped to prioritise the issues and identifying the actions that need to be taken and by whom. It also identified views on the reasons why these actions have not already been undertaken with substantial impact, which is important in drawing up the plan for collaborative action. The scenario planning also helped in categorising the actions needed into short, medium and long term.

Learning from the experience of running previous scenario planning events for SSAs, the workshops were half a day in length. Some of the scenario planning events were followed by consultation events, around the main themes coming from the Stage 1 and Stage 2 analyses. Even so, the number of employers involved in the scenario planning workshops was somewhat disappointing. Additional methods of consultation were included at all stages of the SSA:

- Stage 1 and 2 consultation presentations and semi-structured interviews with employers and employer bodies
- Stage 2 supplementary employer development survey, including face-to-face interviews
- Stage 2 training provider questionnaire covering FE, HE and commercial providers.
- The five stage model survey of companies to assess their level of commitment to workforce development.

The scenario planning process included looking at what is driving change. Participants developed two scenarios for 2020, one positive and one negative. They considered the importance of the change drivers for demand and supply in the labour market and the implications for the types of skills required.

Participants went on to consider what the implications of the trends in each of the two scenarios would be for the main issues identified so far, how to prioritise the issues and what the key actions would need to be to work towards the positive scenario or mitigate the negative scenario.

They developed short, medium and long term action areas with measures of success, identified the barriers and how to overcome them, and considered the question of why this wasn't happening now. Then they identified who needs to take action: the government, HE, employers, etc.

The combined positive scenario, developed from an aggregation of all the positive scenario planning and mitigating the negative scenario is shown as a scenario story in Table 5.1 on pages 48-51. A bulleted summary of the 2020 scenario planning workshops is shown in the Appendix.

In summary, the main points of note from the Scenario Planning and consultations are:

The sector needs more leadership from governments right across the engineering sector in Scotland, Northern Ireland and Wales and this will enable economic success across the four nations and to have a longer term policy agenda will help to create people with the education, skills and attitudes that allow the UK to positively flourish in the engineering world and in society generally.

A particular area of focus is improving the understanding of the sector to a number of target audiences:-

- Public
- Teachers
- Parents
- Young people
- Media

All the above target audiences are crucial in the promotion and development of the existing and future engineering manufacturing industry workforce. This will enable the sector to grow in terms of workforce skills (existing/new) but also in visibility which is an area that has been lacking in the sector to date. The sector needs to do more to excite young people into engineering and a closer working relationship between schools, companies, universities, colleges and business groups will aid in the engagement of children and students in science, technology and engineering. Success would be that the industry would have access to a pool of ready skilled apprentices and engineering would be better perceived by the public, young people and parents.

Another key area of focus is lifelong learning through Further Education, Higher Education, and Continuing Professional Development (CPD) this will involve a culture change amongst organisations which will need to be promoted by government agencies. This will be aided further by a simple funding framework to allow organisations to deliver in house training and encourage modular training that fits. Furthermore, teachers' right through from primary to HE/FE education need to have a better understanding of the sector.

The image of the sector is in the hands of government agencies, educational establishments and organisations to work in conjunction with one another to provide the platform for a generation and maintaining of skills in a perceived unfashionable sector at present.

This will need to change by 2020 and the action areas identified through the workshops are:

(1) Improving the understanding and attractiveness of the engineering manufacturing industry to the public, teachers, parents and the media. Success will be shown by:

    - Public understanding and appreciation.
    - An increase in young people and students interested in engineering careers. Parents encouraging their children to take up apprenticeships.
    - More positive based media coverage.
    - The sector is seen as good for the UK and good for employment.

(2) Lifelong learning through FE, HE and CPD. Encourage multi-skilling and flexibility. Make a step change in employers developing their own workforce. Success will be shown by:

- A culture of CPD will be imbedded.
- Support through incentives and government support.
- Managers keen to sponsor, support, coach mentor and have the skills to do so.
- Companies provide funds.
- Government(s) provide fiscal incentives to learn
- Tailored programmes provided and delivered.
- Companies benefit from skilled staff
- Individuals benefit from careers/rewards and ongoing employment.
- There is an active network of all partners.

(3) Rationalisation of funding. Industry and education to work more closely together. Success will be shown by:

- The industry would have access to a pool of ready skilled apprentices.
- Engineering would be better perceived by the public, young people and parents

(4) Education – Train teachers to understand practical engineering and keep up to date. Success will be shown by:

- More positive headlines in the media.
- More public figures supporting engineering/manufacturing.
- League tables reflect positive changes: wider curriculum.
- Teachers encouraged to do practicals and supported to do these.
- Industry would have access to a pool of ready skilled young people.
- Engineering/manufacturing perceived better by the public.

(5) Create leadership and action-orientated policy for the engineering sector across all the nations. Success will be shown by:

- Sustainable and growing sector.
- Positive public image and respect for the sector across the UK and worldwide.
- Understanding of key measures of the sector e.g. number of companies, recognised engineers, revenue generated, social stability.
- Environmental benefits improve – decline in carbon levels, improving health of groups like the elderly and reduced costs of manufacturing with quality of life to the fore – social benefits.
- Skills migration – more workers staying in and returning to Scotland, Northern Ireland and Wales.

(6) Excite young people into engineering. Success will be shown by:

- Recognition of importance of engaging young people in engineering.

(7) Create people with the education, skills and attitudes that allow the UK to positively flourish in the engineering world and in society generally. Success will be shown by:

- Research being undertaken to make the case for change

(8) Needs a vision from government(s) on policy and on the direction of energy policy in particular.

Table 5.1: Summary of the Scenario Planning

The following is a scenario drawn from the outcomes from the workshops and edited to 'tell a scenario story'. It provides a mix of positive and negative events that 'might' be happening in 2020.

SEMTA MME 2020 DRAFT SCENARIO

With an ever-increasing demand for energy, following the world-wide increase in consumption, oil and gas supply peaked in 2010 leaving a large gap in supply. Though the 'holy grail' of nuclear fusion is growing closer, in the UK the government opted for diverse energy supply in the early noughties allowing energy companies to build a mix of coal, gas nuclear and renewable power stations. Renewables alone, despite vociferous protests from the environmental lobbyists was not though capable of providing the energy needed at an affordable cost.

Industry, once seem as the perpetrator of all that is dirty in manufacture and the major contributor to climate change, has made real inroads into reversing opinion. Fuelled by the clean manufacturing opportunities arising from technological advancement and the drive to invest in clean systems to combat global climate change, industry had invested in new efficient plant to combat the crippling fuel prices of the 2010s and tensions about energy supply.

Government and industry has invested in engineered manufacture, partly to safeguard the UK against rising international tensions. After initial scepticism, investor confidence in the sector's ability to deliver durable shareholder value has grown. Investors signal a willingness to accept greater risks in exchange for greater potential rewards.

R&D in clean manufacturing has increased in the UK which whilst not the biggest global player, has expertise and ethics that retain likeminded workers, shareholders and consumers. Small specialist engineering company start ups continue due to the demand for locally made products 'badged' as local and clean.

For the average consumer, technology fuelled by rapid advances in the communications and entertainment sector have opened the door to trusted 'must have' lifestyles and all that goes with it.

Consumer power is though very much greater, and any company that acts in a way that creates public anger will find the consequences much greater and much more immediate. Manufacturing industry has a great future, but it is one that is still intricately woven into the wants, needs and expectations of society. It will much less be able to ignore public opinion.

Politically the world is growing more threatening with unstable leadership regimes flexing their muscles as the larger countries are powerless to negotiate or use their strength in opposition. Most people realise they have no real control over their own destiny other than to take full advantage of the increasing lifestyle benefits that conveniently supported their 'save the planet' agenda.

For the consumer and business almost everything is being improved by adding some intelligence. New chips incorporate tiny electromechanical or electrochemical devices to do jobs that used to be done by expensive electronics. Chip sensors added in the engineering process allow ‘intelligent’ materials that talk to computers to provide home security systems and communication walls anywhere in the home or workplace.

New buildings materials incorporate chips which alert to air quality. They are integrated into a home health system which monitors our wellbeing on a variety of fronts, watching for stress, diseases, checking our blood pressure, fitness and so on. Children can be monitored in safe homes with information and entertainment surround systems built in and monitored by parents at work.

Industry benefits by recruiting women into old traditional male jobs. The women prove more conscientious and adaptable to change supported by family friendly working packages and ease of home monitoring systems.

Recent progress in nanotech and biotech mean the ability to assemble computing devices from molecular sized components using bottom up assembly, rather than lithography. Making computers out of very small components produces very high processing capability with the ability to outthink humans in every department by several orders of magnitude. Tools such as these have begun to greatly accelerate R&D engineering development.

As a result, 2020 is an exciting time to be an engineer. Engineers are changing the world faster than ever before, the pace is accelerating and public opinion is swinging behind engineering as it provides the lifestyle with guilt free environmentally benign manufacturing. Engineering is subject to a positive feedback loop. The better we make the tools, the faster we can make new and even better tools.

This feedback loop has applied especially well in information technology, where faster and better computers and software have continuously accelerated the next generation. Eventually, we won't even be limited by human intelligence, since computers will become smarter than us, and design even smarter computers still. Then we will be on a very rapid acceleration indeed. Engineers look forward to the new toys and capabilities, but most aren't looking forward to being cut out of the development cycle! What is far from certain is how much human involvement will still be required at any date in the future.

Machines are beginning to increase the productivity and capability of engineers, allow them to do more and more with the same numbers of people. The engineer is gradually becoming more of a system designer, with the detailed analysis and design being increasingly automated. Since this role is already fairly well staffed by industrial designers, the ultimate role of engineers is being challenged - they could quickly be reduced to a supervisory or managerial role.

The futurologists argue that if machines can be built that are far smarter than people would almost all become intellectually irrelevant. We could just ask for something, and machines would do the research, design and fabrication. Engineers would have no more value in this process than ordinary people.

With rapid development of ultra-high technology, they may not feel too concerned by this. Living in a Star Trek world might be adequate compensation for our enforced leisure, so long as socio-economic engineering ensures that we have adequate funds to enjoy it.

The optimists say however that future engineers will still do the human side of engineering. That human engineers will always have a special kind of flair that is different, even if not superior to what machines do - making things appeal, adding the touches that make it all worthwhile, coming up with a really elegant solution once in a while. If the mathematics is done by machines, so what?

One of the consequences of this technology explosion is the vast choice, with a huge range of different gadgets to pick from. People don't handle choice well suffering choice stress, terrified of wasting money or looking uncool. Business is torn between needing to upgrade but struggling to know if what they are investing in is appropriate, if something better will come along tomorrow and if they have a workforce with the skills to operate it?

With the progress in nanotechnology, miniaturisation, biotech and information technology, new technology is largely invisible except in the product that people enjoy. Its sophistication means most people don't know how it works, they just accept that things do their jobs and take it for granted that someone else knows.

Practical knowledge of how to 'do it' is becoming concentrated in a decreasing number of people with an increasing divide between the layman and the engineer or scientist.

Computers and robots are beginning to automate many jobs, leaving those in the care economy that rely on human contact, interpersonal or caring skills like nursing, child care, teaching, policing ands other personal services, as well as lifestyle consultancy and personal trainers.

New technology creates new jobs, but can eradicate jobs too. As technology change accelerates there are changes in the labour market. Industrial robots have made their mark but robotics is expensive, and many low-paid physical and service industry jobs have been unaffected - sadly, some people cost too little to be worth automating.

The human contact service economy is growing. The care economy that a decade ago employed about a fifth of the workforce, is expected to rise to about half over the next decade. People will mostly be happy to cease being cogs in a machine and will rejoice in having more human contact in their jobs.

Manufacturing is still relatively immune from internet impacts, dealing as it does with physical processes. A car can't be assembled on a web site and downloaded to a customer. However, products will increasingly include information technology accessed and controlled from anywhere via the net.

Humans and machines will mostly work together making the most of their relative strengths. Customers may be involved frequently during the later invention stages and throughout the design process. Even when a concept is just a few bits in a computer file, visualisation technology can help customers to appreciate the possibilities and feed their comments into the design process, often inventing features that perhaps an engineer might have overlooked and omitted.

Chips will be everywhere so some physical products are part of a service rather than being sold outright. The customer might buy a television 'service', and the actual TV set is remotely maintained by the leasing company. This allows service bundles to be tailored for long after the TV delivery.

All products eventually die and green culture dictates that they should be recyclable. Embedded identification chips will direct materials for appropriate recycling too.

We are well on the way to an information dominated economy where instead of employing a large static workforce; companies retain a core of key people and bring in others as contractors, project by project.

Alternatively, people in more traditional companies work on a single project with appropriate employees from other companies. Either way, many people will change their jobs more frequently. They will not want to uproot and move each time they change jobs, so will welcome teleworking, often working in local telework centers with their neighbors, allowing a feeling of stability of workplace as they move between contracts.

This flexible virtual company way of working is two sided. Companies can operate more responsively to the market, being leaner and meaner, but workers will also have more choice and be more effectively mobile, so will be able to negotiate better deals.

Both sides benefit. As artificial intelligence improves, we will see companies being established by computer, automatically identifying market opportunities and setting up virtual companies to exploit them by linking together the necessary people (and computers) to do the job from the available pool. Such intelligence may be employed by the contractors themselves or by agent companies.

In the further future, we may see companies staffed entirely by software entities. If these are more capable or efficient than human competitors, then we will see change indeed.

6 Key themes

The importance of SMEs:

Across all sectors of the UK economy the proportion of SMEs is very high. 99% of establishments in the UK MME sectors are SMEs and 94% are small (<50 employees). Although the proportion of micro (<10 employees) businesses in the UK MME sector is lower than that for all UK sectors (75% compared with 86%), the fact that the vast majority of the MME sector establishments are small has important implications in terms of engaging the sector in a more concerted workforce development strategy. Therefore, it is important to identify clusters of companies in the sectors and also look for opportunities for working with other related sectors or larger companies in the supply chain.

Workforce profile:

The majority of the workforce is white, male and works full-time. About 5% of the MME workforce in the UK is non-White, which compares with about 8% for the UK economy as a whole. Women only represent 16% of managers in the MME sector compared to 35% of women managers across all UK sectors. In terms of professional occupations, only 7% of professionals in the MME sector are women, compared to 43% across all UK sectors.

The UK MME workforce has an older age profile than the UK economy as a whole. Approximately 46% of the UK MME workforce is aged 45 years of age or older compared to 39% across all UK sectors.

The current levels of skills and qualifications in the UK MME sectors at NVQ level 4 and above are lower than the UK economy as a whole (22% compared with 32%). At lower levels, 34% of the UK MME workforce has either a qualification below level 2 (22%) or no qualification at all (10%). This suggests that there is a need for constant upskilling across all the MME sectors.

Skills shortages:

The UK currently has a low unemployment rate which means that there is a competition from all sectors of the economy for skilled and even unskilled workers. 17% of UK MME establishments experienced hard to fill vacancies, with an estimated 13,000 hard to fill vacancies in total across the UK MME sector. 7% of UK MME establishments reported ‘problems’ recruiting suitable graduates, rising to 18% for large MME establishments.

The main impacts of recruitment difficulties included loss of orders, increased work in progress, restriction to business development, missed deadlines, loss of quality and increased running costs. All these factors will have a negative impact on productivity and ultimately profitability of establishments.

Recruitment from the EU, particularly Poland, has helped to alleviate hard to fill vacancies in the short-term, however this is not likely to be a long-term solution due to tighter restrictions in the UK on work permits for overseas workers and major inward investment into the countries currently supplying these overseas workers.

There may be opportunities to extend recruitment to other parts of the population such as ethnic minorities and women that have not traditionally been involved in these sectors, to increase the pool of skilled labour available to employers.

Skills Gaps:

20% of UK MME establishments reported skills gaps. 70% of these reported skills gaps were in technical skills, so this is where the priorities for upskilling must lie. In addition there were management skills gaps across a range of occupations, both technical and non-technical. Nearly a third of UK MME establishments felt that they had seen no real skills change over the last 2-3 years and did not expect any skills change over the next 2-3 years. This perceived lack of skills change ranged from 37% of micro MME establishments to only 15% of large MME establishments.

Employment trends:

The UK MME sector has been declining in terms of employment over the past two decades and at a faster rate than the UK economy as a whole. The Semta/IER forecasts indicate that the UK MME sectors will experience a negative annual growth rate of -0.7% per annum between 2005 and 2014.

There is, however, a significant recruitment requirement to replace those skilled people who retire or leave the sectors and this will be a major driver of future employment in the sector. Taking this in combination with the demand due to expansion, the forecasts suggest that nearly 235,000 recruits will be needed by 2014, equivalent to just over 26,000 recruits every year. The numbers in most occupations are expected to increase, particularly the number of managers, craftspersons and operators.

Productivity

Productivity for the UK MME sector is higher than the average for all sectors of the UK economy. However, productivity for the UK MME sector is lower than that found in the corresponding sectors in competitor nations, even though the UK is catching up.

Over a number of years, R&D investment by the UK MME sectors has decreased and is in fact lower than some comparative engineering sectors. This has stifled innovation and further productivity increases.

Key themes

This evidence of the demand-side issues has been shown to employers at a number of consultation events and they have identified a number of priorities to address these issues:

Key Theme 1: Leadership & Management

Rationale: If managers are not interested in upskilling then the rest of the organisation will not do it. Specific leadership and management training is considered to be a foundation stone of good management practice required for any company to build a more robust and competitive business. Effective leadership and management are also essential to stimulate R&D and innovation.

Large MME establishments are most likely to cite skills gaps for professionals and managers as having the biggest impact on their business.

Various skills indicators suggest that managers have a positive impact on productivity levels and that investment in management and leadership and improvements in management structures, resource planning and staff training and development can have a positive impact on 'bottom line' business performance. Some MME employers (particularly SMEs) do not currently have a business plan, training plan or assess their employee skills gaps.

54% of managers in the UK MME sector are aged 45 years or more compared to only 43% in all UK sectors. The greater the number of managers approaching retirement, the greater the experience that will be lost from a sector and this has implications for succession and planning within the MME sector. From 2005 to 2014 it is anticipated that there will be a total demand for 46,000 new managers into the UK MME sector.

Of those managers that are currently in the workforce, many have high level technical qualifications as they have been promoted through their organisation, but will not necessarily have a formal management qualification or receive the appropriate management development required. As the nature of the skills required of managers is changing rapidly, with a growth in the demand for, amongst others, leadership, communication and planning skills, entrepreneurship and adaptability to change, this places greater emphasis on the importance of management development and building management competencies.

UK managers are perceived to be poorer than their US, German and Japanese counterparts in every type of skill, particularly in terms of their adaptability, entrepreneurial and technical skills, and their ability to look well in to the future. It is not surprising therefore that nearly one third of MME employers perceived that their skills needs had not really changed over the last 2-3 years, or expected skills to change over the next 2-3 years. This has serious implications for the future in terms of these companies having a flexible workforce that can adapt to rapid market change.

Key Theme 2: Process Improvement (Productivity and Competitiveness)

Rationale: Just over half of UK MME companies appear to be using process improvement techniques. This has to change over the next five years. It is essential that all MME companies are utilising accredited process improvement tools and techniques to compete in a global economy to survive, grow and sustain their position. Implementation of lean manufacturing processes will enable companies to create quality products, high productivity and excellent customer service. This will directly improve bottom line performance.

The introduction of lean manufacturing techniques and skills, and increased use of automation technology has given some manufacturers substantial productivity gains enabling them to compete with overseas manufacturers. Other than with large MME establishments, the concept of lean is not as well advanced in the MME sector compared to other engineering sectors such as automotive and aerospace. A greater understanding and uptake of process improvement must occur within SMEs in the MME sector to drive productivity improvements for the overall sector.

The key drivers of skills change for the MME sectors, in order of importance, include:

- The introduction of new technologies or equipment.
- Development of new products and services.
- New legislative or regulatory requirements.
- Introduction of new working practices.

All of these factors will drive productivity improvements and ultimately skills change.

The skills of the workforce as a whole, from operatives to managers, need to underpin all these improvements in order to make productivity increases sustainable. Possession of a level 3 qualification – the equivalent of two A-levels - is increasingly becoming the base-line for employability in the engineering manufacturing sector. With just over 40% of the present MME workforce not qualified to this level, increasing the qualifications base of the sector would help to maintain competitiveness, jobs and exports in the face of growing international competition from established and emerging markets.

Semta will be trying to improve productivity and profitability within the sector by further expansion of the PAC Framework model, including building up the infrastructure for delivery by increasing the number of trained and qualified PAC analysts, engineers available to do the in-company interventions and FE provision to deliver the B-IT NVQ.

In addition, MetSkill's productivity improvement activity (MICE) will be extended further into the metals sectors.

Key Theme 3: Technical Skills

Rationale: 70% of skills gaps reported by MME companies are in core technical, engineering, craft and production skills.

Hard to fill vacancies are concentrated in technical roles, particularly craft, operator, professional and technician occupations. The main reasons cited for these difficulties were lack of skills and qualifications and specifically a lack of NVQ-qualified applicants and applicants with GCSEs, A-levels and HNDs.

MME employers felt that skills gaps for those currently working in these occupations have the most significant effect on their business. Higher levels of technical skill will also be important for increasing levels of research and development and innovation within the MME sector.

In the short-term many companies in the MME sector are resorting to recruitment agencies or using overseas workers, particularly those from Poland, to cover their recruitment difficulties and skills gaps relating to technical occupations and skills. This is unlikely to be a long-term solution due to cost and quality issues of using staff from recruitment agencies, tighter restrictions on work permits for overseas workers and the uncertainty surrounding how long these overseas workers will wish to stay within the UK.

Across the UK MME sector as a whole, technical and engineering skill relating to CNC machine operation, CAD, welding skills, tool setting and general engineering skills need to be improved in terms of the volume and quality of the technical training taken up by the MME sector to tackle these technical skills gaps. This needs to occur across all size of MME establishment, not just SMEs in order to improve productivity.

Key Theme 4: Apprenticeships

Rationale: In light of technical skills gaps in the current workforce, difficulties in recruiting technical occupations and the large numbers required to fill replacement demand requirements it is vital that employers within the MME sector, particularly those in SMEs, look at introducing or increasing the number of apprentices they have.

This will ensure that the MME sector has a steady stream of appropriately qualified and experienced workers, with the actual technical skills required by sector **and will go some way to alleviate the shortage of technical skills identified. In Scotland, nearly 60% of the establishments with skills shortages due to lack of applicants with the required qualifications and skills, cited a lack of apprentices as a major issue and in Wales this figure was nearly 50%.**

Currently, 22% of MME establishments employ apprentices, a fall of over 10% compared with five years ago. The numbers starting apprenticeships has also decreased in recent years: starts on engineering Apprenticeships in England fell by 12% from 2002 to 2006 and starts on engineering Advanced Apprenticeships by 16%.

7 Action planning

Key Theme 1 : Leadership & Management

Rationale: This is the most important of the four themes – since if managers are not interested in upskilling then the rest of the organisation will not do it. Specific Leadership and Management (L & M) training is considered to be a foundation stone of good management practice required for any company to build a more robust and competitive business, however, only 5% of MME sites report management development as a need for their business (source Semta LMS 2007).

Priority	Action	Semta activity	Employer activity	Delivery partner activity	Proposed measure of success
To rapidly grow the level of trained leaders and managers in MME SMEs across the UK by introducing them to a package of business-oriented and cost-effective leadership and management training	Develop a package of accredited products suitable for Managers of SMEs To include: • Structured approach to training (i.e. Basic IiP) • Business to Skills model • Team Leader Training (L3) • Middle Manager Training (e.g. MetSkill Managing for Success L4 programme) • Higher level Strategic Management/Leadership programmes (incl. a self assessment tool to measure outcomes)	Semta to develop and promote the product package across the MME sector. To include accreditation of short programmes onto the CQFW	Take up places on the programmes and pay relevant employer contribution. Provide feedback, attend meetings, steering groups, etc, to develop the offer and monitor success.	DIUS, DCSF, LSC, RDAs, Scottish Enterprise and Highlands and Islands Enterprise, DEL, InvestNI, Management and Leadership Network (MLN) all to review how they might individually or collectively support this approach. WAG/DELLS to continue supporting L3 & L4 skills in Wales through the 3 year Business Development in Wales Project	No. of Leaders and Managers undertaking T&D/Continuous Professional Development (CPD) (e.g. target of 100 L4 NVQs in West Midlands) Increase in the number of Leaders and Managers understanding the key skill drivers: • introduction of new technologies and equipment • development of new products and services • understanding new legislative / regulatory requirements • introduction of new working processes Increased level of management T&D activity across the sector % of companies : • with business plan • with training plan • with training budget • assessing skills gaps • undertaking on/off the job training • with appraisal systems • with succession planning systems Companies moving from lower to higher stages (majority Stage 2 to 3) under the Semta“5 Stage Model”
	Provide a funding package for these products to enable SMEs in particular to obtain funding support to train leaders/their managers.	Secure the funding (e.g. through Train to Gain, ESF or sector compact funding) and broker to employers in England. In Scotland and Northern Ireland, Semta / ETCNI to explore the potential for brokerage activity aimed at supporting employers’ needs. In Wales, Level 3 and Level 4 funding is already available from WAG via Semta. Further promotion and sales activity required to ensure all employers aware of and using it.	Complete the training/qualifications as appropriate to claim the funding. Provide feedback to Semta on business benefits as a result of undertaking the leadership/and or management training	LSCs / RDAs / DIUS, Scottish Enterprise / Highlands and Islands Enterprise, DEL / InvestNI / MLN to provide the funding and support take-up through high quality local brokerage (e.g. MAS) Delivery partners to work in partnership with Semta to build upon current brokerage activity for SMEs In Wales, DELLS to continue to provide the funding and support take-up through high quality local brokerage (e.g. MAS, HRD advisors)	Take up of available funding Number of leaders/managers supported by the funding Business benefits – financial and non-financial

	Promote the business benefits of the training package to employers directly and through the network of national and regional clusters, Trade Associations, MAS, SMAS, etc.	Identify and promote employer champions, organise works visits, present at events, produce and disseminate case studies, etc.	Complete training evaluation feedback and monitor ongoing performance.	Working with Semta, provide effective joined up Information Advice & Guidance (IAG) to the 55,000 business sites in the MME sector.	Employers reporting measurable benefits as a direct result of the training.
	Develop a network of approved providers, covering the whole of the UK, to deliver these products to the approved quality standard.	Identify and accredit the Providers and market and sell the products in conjunction with delivery partners, e.g. licensed providers, brokers	Identify training needs for individual managers. Recommend sources of high quality management development provision or products they have used.	Support and recognition from government departments and agencies, training providers and other stakeholders.	An accessible, up to date, one-stop shop for employers to source provision and arrange funding, delivering the measures of success identified above.
To provide additional tax relief to SMEs who achieve an L & M specific competence.	Provide tax relief for Leadership & Management training for SMEs	Draft proposal and lobby government.	Specify relevant expenditure on approved L & M training in annual accounts.	All appropriate government departments to review how they might support this new initiative.	Measures of success as above.

Key Theme 2: Process Improvement (*Productivity and Competitiveness*)

Rationale: Few MME companies are using process improvement techniques. This has to change over the next 5 years. It essential that all MME companies are utilising accredited process improvement tools and techniques to compete in a global economy to survive, grow and sustain their position. Implementation of Lean manufacturing processes will enable companies to create quality products, high productivity and excellent customer service. This will directly improve bottom line performance.

Priority	Action	Semta activity	Employer activity	Delivery partner activity	Proposed measure of success
Mobilise more companies, especially SMEs, to adopt and implement a structured approach to process improvement using the best tools for their environment and business.	Promote the benefits of process improvement interventions through employer champions, case studies, works visits, etc.	Targeted marketing campaign using high profile, national vehicles. Utilise national/ regional networks, Trade Associations, Trade Unions, etc.	Higher levels of engagement. Create continuous improvement culture in the workforce. Identify internal champions. Train in the appropriate techniques. Choose the correct interventions.	VET providers (Manufacturing Advisory Service (MAS), Manufacturing Technology Partnership Ltd (MTP), SMMT-IF/MICE and others where appropriate) to promote process improvement	No. of MME sites actively participating
	Implement a national Productivity and Competitiveness Framework (PAC) across the UK	Contract with the 3 nations and 9 English regions to pilot the PAC programme. Establish a sustainable cohort of Productivity Analysts across the UK	Employers to receive process improvement activities being underpinned by the up-skilling and qualifying of the workforce	LSC, Scottish Enterprise, Welsh Assembly Government and DELNI together with MTP to engage with the implementation of the programme. NSA-M to become the managing agent to sustain the developing network	Company Level Measurable process improvements leading to profit enhancement (Quality cost Delivery Measures (QCD))
	Create a pool of accredited providers of process improvement techniques in the UK.	Secure funding at national and regional level.	Recommend sources of high quality provision they have used.	As above - deliver high quality training activity using verified methodology Accreditation to be put in place by appropriate body e.g. NSA-M in England, Wales and Northern Ireland	No. of accredited training providers per nation / region
	Each nation / region to develop a costed action plan targeting MME companies (mainly SMEs) by 2013.	Secure funding at national and regional level. Lead the action plan development and implementation activity	Feed needs and requirements into the action plan at local level.	Delivery partners to work together to implement the plan.	No. of accredited/funded intervention projects in companies No. of companies on which had impact Measure of productivity and competitiveness GVAs and margins Improved customer service (QCD) Bottom line gains No. of case studies Increased no. of B-IT N/SVQs and/or individual units achieved

Key Theme 3: Technical Skills

Rationale: 70% of MME establishments that reported skills gaps have technical skills gaps, mainly among their core technical workforce (professional engineers, technicians, craftspersons and operatives). The skills gaps in these technical roles have the most significant impact on the business – (source Semta LMS 2007). The main skills gaps are in CNC machine operations, CAD, welding skills, tool setting and general engineering skills.

17% of the MME establishments experienced HtFVs, the main shortages again being in technical skills. 7% of those that recruit graduates had problems, particularly recruiting mechanical engineering and then electrical engineering graduates.

A high proportion of MME establishments use on-the-job training and just over 70% of these development some of their own in-house training solutions.

Priority	Action	Semta activity	Employer activity	Delivery partner activity	Proposed measure of success
Increase Employer Engagement with the National Skills Development System	Identify the opportunities to increase provider and funding focus to meet employers' requirements	Semta to provide skills balance sheets for each region and nation to establish current capability and capacity to meet employer future demands Semta will establish a national system to establish the funding of priority qualifications only, to meet employers' needs	Groups of employers to endorse local activity that would meet their needs	DIUS, DCSF, LSC, RDAs, Scottish Enterprise and Highlands and Islands Enterprise, WAG, DEL, InvestNI, Management and Leadership Network (MLN) to develop provider development funding to meet provider up-skilling requirements and appropriate employee funding	Focused qualification delivery being appropriately funded to meet employer requirements Reduction in technical skills gaps and shortages in UK
	Develop the provider network to deliver world class skills that meet employers demands	Semta will work with NSA-M, LSDA , QIA and DEL to develop up-skilling of the provider network's capability to deliver regional identified needs	Regional employers to inform Semta negotiations with NSA-M, LSDA, WAG, Scottish Government and DEL	NSA-M, LSDA, QIA and DEL respond by the development of the capability and capacity of the providers in deliver improvements	Appropriate validation of provider capability to deliver endorsed programmes that meet the employers' needs
	Ensure that qualifications meet the employers skills needs in content and flexibility	Semta will provide a Sector Qualifications Strategy (SQS) to inform the future qualification requirements of the sector Semta will future proof its current successful vocational qualifications by migrating them into the UK's Credit Frameworks and continue to develop the current qualification framework Semta will establish an English Approvals system that will ensure employer related demand qualifications will only enter the QCF and advise on the content of other devolved administrations credit frameworks	Employers will lead the Sector Qualifications Strategy in development and implementation Employers will identify the successful current qualification by historical use or independent justification Employers will underpin the decision on what qualifications will enter the Credit Frameworks	QCA, WAG, CCEA, SQA, DEL and Awarding Bodies will engage by supporting the development and implementation of the Sector Qualifications Strategy to meet employer requirements Regulators will support the migration process of successful qualification into the Credit Frameworks Government departments and regulators will work in partnership to establish appropriate Semta led qualification approval system for the sector	Published Sector Qualifications Strategy and Awarding Bodies portfolios reflecting the requirements Appropriate level of qualification be recognised on the credit frameworks An operational approvals system gate keeping the appropriate qualifications entering the credit frameworks
To develop companies' ability to deliver quality "in-house" training to upskill their existing workforce according to their business needs and nationally recognise achievements	Identify and confirm major general engineering / maintenance skills needs (from the SSA Stage 1 Skills Needs Analysis), e.g. CNC machine operating and programming, welding, CAD CAM, multi-skilled engineers, etc.	Specify the top 5 priority skill areas in each of the 3 sectors – metals, mechanical and electrical	Conduct Training Needs Analyses (TNA) to identify skills gaps and deficiencies	Delivery partners to provide data from existing sources into technical skills needs in the metals and engineering sectors. Group Training Associations (GTAs) and other providers to assist in identifying local training needs	Ultimately fewer reported technical skills shortages and gaps
	Pilot QCF recognition in company training and vendor programmes	Engage in Pilot activity with QCA, WAG, CCEA, SQA and SSDA. Develop appropriate infrastructure to all national recognition of employees achievements	Employers to provide a number of training schemes for the pilot activity	QCA, WAG, SQA, SSDA, DEL to provide the support to deliver a successful pilot	Post pilot: a recognised QCF system of approval managed by Semta on behalf of stakeholders to nationally recognise employer schemes

Develop a product/support package which will enable companies to deliver “world class in –house training” in technical skills delivery.	Develop the in-house training development product (inc best practice guide/workshops). Obtain funding to support implementation in companies (inc Adult Apprenticeships where appropriate).	Contribute to the development of the tool where good practice already exists. Use the tool effectively when developed, monitor and feedback.	Training providers, professional bodies and RTOs to feed into the development of the product. Provide training courses and adult apprenticeships.	An effective in-house tool valued by an increasing number of employers.
Develop a number of accredited/ lead providers across the UK to offer the product.	NSA-M to identify the best providers to partner with to deliver the product. SSC to undertake equivalent activity in the UK	Provide validated quality providers they have used to support in-house training.	Work collaboratively with Semta to promote products to employers.	Better technical training at point of need for UK MME companies. Increased no. of relevant technical qualifications and professional institute membership (e.g. inc/chartered engineers)
Equipment suppliers to train customer staff to better use and exploit the equipment.	Secure funding to enable this to be done in greater volume and more cost effectively in companies.	Quantify demand.	Equipment suppliers, though leading TAs, to support the scheme. Also, cost-effectively lease equipment into training centres.	As above.
Focus on developing maintenance skills – an important generic skill common to companies across the sector	Identify and share sources of best practice in maintenance skills development (e.g. NI maintenance initiative) across the four nations	Participate in opportunities to learn/share knowledge Identify and action maintenance skills development opportunities in their businesses	Training providers to work with employers and Semta to identify and fill gaps in provision	Number of multi-skilled/qualified maintenance engineers working in the MME sectors
Support companies of all sizes seeking develop their in-house technical training facilities/schools (In-company “academies”). Including large companies which may also offer their facilities out to smaller companies in their locality	Develop a brokerage system to allow the sharing of resources across companies to deliver opportunities for up-skilling of the workforce	Employers to register recourses capacity that could be allowed to up-skill other companies employees Employers to register up-skilling requirements to allow a match activity to be established	Delivery partners to engage in supporting employees development with regards to in-company development programmes	Brokerage system set up and employers providing resource and uptake of training activity across different organisations
<u>Skills Shortages and Recruitment;</u> Technical shortages: • CNC machinists • CNC programmers (technicians) • Experienced technicians	Short term solution – assist companies in recruiting from overseas in key technical roles. Image and attractiveness of sector Increase numbers with science and maths GCSEs and ‘A’ levels (Standard Grades and Highers in Scotland). Diplomas YA	Semta to provide appropriate evidence whether there is a need to import labour from overseas to include occupation, type and numbers. Semta to make application to appropriate agency to establish where there is a need for an occupation to be listed as a skills shortage. Establish and implement a promotional campaign to deliver regional messages to attract new entrants. Identify current activity and consolidate activity against campaign requirements Semta to provide regional requirement statistics. To continue to support appropriate activity around English, Maths and Science and applied qualifications in schools. Further develop the YA Scheme to schools. To negotiate apprenticeship / work placements with employers to support related School activities.	Employers to provide appropriate evidence of the employment requirement for the identified occupations required to be imported into the UK and provide written support Employers to provide occupation champions to underpin campaign Employers to provide work experience places to support regional requirements for the related school activities.	The Home Office/ Border and Immigration Agency (BIA) The BIA *Sector Advisory Panels (MAC from April 2008)* *Appropriate government departments to support campaign. National and regional Stakeholders that are active in this area to support the campaign* DCSF to support Semta proposal. Learning providers to establish appropriate links between employers and schools.	Reduction in craft and technician skills shortages, particularly in relation to CNC and other technical skill shortages

<u>Replacement demand:</u> Number of people with experience declining over the next 10-15 years with level of retirements from the sectors due to age profile). This will produce a significant skill loss to the sector.	Implement a strategy to balance requirements placements versus. leavers Upskilling of current workforce, i.e. Level 3 to Level 4 and Level 2 to Level 3.	Establish a regional profile to identify replacement demand. Develop regional action plans and implement with appropriate stakeholders Semta to inform provider networks and work with them to establish appropriate up-skilling regional activity to meet employers demands	Employers to provide appropriate regional evidence and uptake of new employees to meet replacement demands Employers take up appropriate up-skilling requirement to meet business demands	Government departments to support activity against the regional plans. Regional providers to establish the capability and capacity to deliver demand	More highly skilled workforce. Greater proportion with skills at Level 3 and above (i.e. intermediate level).
Recruitment of graduates – not only as professional engineers, but also feeds into leadership and management objective to provide some of the managers for the future.	Increase image and attractiveness of sector.	Establish and implement a promotional campaign to deliver regional messages to attract new entrants. Identify current activity and consolidate activity against campaign requirements	Employers to provide occupation champions to underpin campaign	*Appropriate government departments to support campaign. National and regional Stakeholders that are active in this area to support the campaign*	Maintain/increase numbers undertaking degrees in engineering (particularly mechanical engineering. Increase in proportion of graduates choosing engineering as their first destination after graduating.
HNDs/Foundation Degrees (Foundation Degree number not matching decline in HNDs. employers familiar with HNDs/HNCs, etc.	Increasing numbers	Establish a regional profile to identify demand. Develop regional/national action plans and implement with appropriate stakeholders	Increased employer involvement and support in Foundation Degree activities	Agreement with appropriate HE institutions to deliver demand requirements. Agree appropriate funding support with government departments to match plan requirements	Increase in supply of HNDs/Foundation degrees. Measures of employer involvement.
Increasing skills development in SMEs.	Flexibility of delivery. Methods of engagement.	Semta to lead an initiative to review current skill delivery models and develop increased flexibility of engagement to meet employer requirements	Employers to provide appropriate evidence and future requirements to increase flexible delivery of skills	National and regional funders, NSA-M, Association of Learning Providers (ALP), National Forum of Engineering Centres (NFEC) to support study and implement appropriate changes	Number of new delivery models to be tested reviewed and nationally implemented
Special initiatives for small companies (<50 employees (94% of MME establishments)).	Engagement through the supply chain	Establish links with Original Equipment Manufacturers (OEM) organisations and develop supply chain initiatives to develop improved processes and related skills to increase overall business improvements	OEMs to engage with Semta to develop regional plans of delivery across supply chain companies and support implementation	National and regional funders, NSA-M, to support negotiations with OEMs and implement appropriate changes	Number of OEM delivery plans to be established and implemented

Key Theme 4: Apprenticeships

Increase the quantity and quality of intermediate skills at levels 2 & 3 held by the workforce by doubling the number of apprenticeships by 2013. Adults already in employment will be principally targeted together with young people according to a 2:1 split between adults and young people.

Rationale: only 22% of companies in the UK MME sector provide apprenticeships (59% of large sites, 40% of medium sized sites, 27% of small sites and only 7% of micro sites) – source Semta LMS 2007

There is a need to increase the number and quality of apprenticeships (particularly at medium and small sites) to offset the skills lost through retirement and leavers, and new skills needed through changing technology. This will go some way to alleviate the shortage of technical skills identified by 2013.

Priority	Action	Semta activity	Employer activity	Delivery partner activity	Proposed measure of success
To develop detailed, costed action plans in each nation and English region to double the number of apprenticeships (as appropriate per nation / region) by 2013.	Promote benefits of apprenticeships in all nations and regions to employers, schools/young people/parents. Raise awareness of the ageing workforce issue amongst employers through skills age profile and TNA. Target Adult employees between the ages of 25 to 50 yrs within the 0.9% or 470 companies who have 200+ employees. Target 16 to 18 school leavers this maximises support funding to employers Target 19 to 25 yr olds as appropriate	Develop targeted national and regional apprenticeship marketing materials for appropriate client groups , distribute and follow up Develop targeted marketing materials, and engage companies by using a dedicated team of apprenticeship/skills advisors knowledgeable about local operating conditions who can advise companies on the benefits of skills development Communication and awareness raising – e.g. proposed Semta web campaign, supported by specific local marketing activity as appropriate Marketing activity to ensure that more school and college leavers are applying to enter employment in the MME sectors and thus increase the pool of quality apprentices available to the sector	Employers react to Semta and national and regional marketing campaigns to address skills issues Analyse their internal demographics in order to understand the business Risk i.e. the % of 60+ vs. % of 16 to 21 plus. Assess recruitment needs for replacement demand as well as for growth and new technology. More employers providing apprenticeships.	Support for the campaign from EEF, Trade Associations inc BEAMA, MTA, EAMA and Metals Forum, Regional Clusters, Trade Unions. Link in existing careers promotion activity (e.g. BCSA campaign to attract young people into careers in structural steel). Enhanced IAG delivery. Training providers and Semta to develop apprenticeship delivery models that are practical for SME use Schools to be encouraged to release teachers for short placements in companies to understand Manufacturing Stakeholders to support	Increasing number of young people applying for and taking up apprenticeships in the MME sector, in order to be able to fulfil the growth in apprenticeship places
	Roll-out and promote the success of Young Apprenticeships in England, across other nations.	Promote, develop case studies, website and other stakeholders.	Structured work placement circa. 50-days & support for school-industry links e.g. teacher placements. Case studies and company promotion locally.	Action plans with target Schools in each area, plus Educational Business Partnerships (EBP), STEMNET, Engineering Technology Board (ETB), etc.	No. of starts/completions. Annual independent evaluation .
Develop, gain approval and implement a range of appropriate apprenticeship frameworks at level 2, 3 & 4 for use in the sector.	Each nation / region to develop a costed action plan to encourage & deliver increased apprenticeships (inc. adult apprenticeships) together with increasing high quality provision and demand.	Lead the action plan activity and secure funding regionally/nationally to enable the action plans to be implemented.	Employers to engage with the best local providers to meet their needs.	Provider networks LSCs/DEL/WAG/SEn/HIEn ,etc. to identify delivery capacity and sources of unused capacity, e.g. under-utilised FE college or MoD facilities. Set up a clearance web site for applications and opportunities in each region	KPIs as above: Aim is to increase apprentice starts and completions year on year
	Map and quality assure provision	Accredit good provision and advise/sign post employers.	Identify good provision which they value and promote via cluster/local employer networks.	Funding, support and recognition from government departments plus Awarding Bodies & Education and Training Inspectorate.	Increased capacity to support and grow the apprentice provision

	In conjunction with key providers, develop flexible apprentice delivery options to meet the needs of smaller companies (SMEs).	Quality assure delivery models against framework requirements	Engage apprenticeships. Provide assessment capability	Training providers to develop flexible apprenticeship delivery models	Develop employer engagement in the MME sector to contribute to Semta's Leitch targets

APPENDIX

SEMTA - METALS MECHANICAL & ELECTRICAL (MME) SECTORS
Initial Summary - 2020 SCENARIOS and Supporting Workshop Material

Contents

Scenario Thinking and Critical Success Factors

1. Change Drivers and Trends to 2020

1. 1 Social

- Skills shortages and low rate of improvement in the skills profile impacting future competitiveness of business of all sizes.
- Society values cost and wants cheap products now we – pay lip service to products manufactured to high standards and have a throw away mentality
- No jobs for life in any sector not just manufacturing
- Demise of manufacturing sector means we have not only lost skills but also lost the ability to train people in the skills. There is a lack of good quality training facilities – not many centres of excellence – few opportunities for people to use fully functional machines. Training is given on machinery that is not used in the real world.
- Lack of planning for skills requirements- few SMES have written business plans and therefore do not plan for future skills requirements.
- Demographic trends - aging population and the age profile of workers - many older skilled workers are approaching retirement
- Attracting people into manufacturing is difficult. Governments approach to manufacturing does not help attract people
- Attitude of young people to work – do not want to work hard

1.2 Education

- School system puts pressure on children to stay in education rather than take jobs and develop as apprentices
- There is a lack of technical skills or the ability to teach skills in colleges. There is a lack of colleges to provide the skills or good quality training facilities – no machinery to train on. Companies feel isolated in where to look to get their workers skilled – local colleges cannot provide the specialist courses e.g. in niche areas such as castings – There is a also a need for skilled assessors & qualifications
- Lack of young people coming in – Image of sector
- Parents do not want to encourage young people to go into the sector
- Teachers do not have right image of engineers.

1.3 Political

- Health and safety cost of litigation
- Corporate tax rates in Northern Ireland v Eire
- Increased environmental legislation
- Strong influence of EU and increased legislation
- Government believes manufacturing is a “sunset” industry
- Nobody understands engineering
- Increase legislation on health and safety and environmental legislation puts increasing pressure on industry. Other countries even in Europe are slower to enforce the regulation than in the UK. Government views manufacturing, as “sunset” industry and nobody in the government really understand engineering
- Lack of critical mass among small companies to be able to get the training they need
- May not be any funding for training locally - local college may not have the right skills to deliver specific training Companies are short sighted and do not invest in training

- Government attention to manufacturing – focus on finance & services not manufacturing.
- Too many initiatives & funding pockets.
- Globalisation – large number of foundries in India and China
- Legislation – badly implemented environmental legislation

1.4 Economic

- Historically lower salaries in Northern Ireland have lead to increased demand for wage increases and pressure on costs
- Higher cost of living in NI increases pressure on employers to close the gap in salaries with the UK
- Movement of workers from EU likely to reverse leading to a problem to attract migrant workers in the future
- Large amount of SMEs and micro businesses - lack of critical mass
- Funding targeted at SME and nothing available of larger companies – benefit to smaller companies, however this has a knock on effect for the supply chain. If there is investment in larger companies, it can have positive impact to companies in the supply chain.
- UK not manufacturing but acting as agent importing & selling on
- Moving manufacturing to eastern Europe
- Global market – means many of the raw materials are same price. Currently only labour costs are lower

1.5 Technological

- Electronic controls for all products
- Rate of obsolescence
- Ability of small business to invest and keep up with new technology

1.6 Environmental

- Natural resources - cost of oil, copper and steel
- Global warming dominates the debate and leads to increased cost to industry.
- Requirement to cut down emissions may lead to less manufacturing in the UK
- Manufacturing going abroad where environmental issues not tackled**.**
- Global warming dominates the debate and has increased costs for manufacturing.
- Manufacturing plants are going to countries where environmental measures are not enforced.
- Philosophy to cut down on emissions means we will export to other countries our carbon foot print NIMBY – we do not want manufacturing on our back yard – pressure to move away from UK.
- Energy is critical – cost of energy is however a global issue – commodities markets for raw materials are also global real key to difference in competitiveness is labour costs,
- UK companies exporting their carbon footprint due to communities not wanting manufacturing in their area. However manufacturing is cleaner than perceived.
- Energy supply is critical to the sector. High energy costs – UK pay a lot for energy but not the highest costs in Europe

Scenario 2020

2. NEGATIVE FUTURE SCENARIO

- Public attitude to manufacturing engineering tends to be negative. Media presentation of the sector concerned with closures and highlighting overseas manufacture influences public opinion away from seeing positive attributes. Parents and teachers have little confidence in engineering as a worthwhile career.
- Politicians do not appreciate the economic value in financial and human terms of developing skills and preserving the social infrastructure. In addition, manufacturing is associated in people's minds with dirty polluting factories. There is no appreciation that it is engineers who hold the key to efficient and green technologies that remove pollution from the manufacturing process.
- High value added currently in the UK may be done elsewhere in 10 years
- More companies act just as agents buying in products from other parts of the world and just box them and ship them on – some quality control but not much.
- Continuing shift of manufacture to China and India results in poaching of the best talents and the loss of skills and educational capacity.
  These economies are developing fast with people working smarter, harder and cheaper
- China starts to keep the goods it produces and increasingly needs more raw materials.
- China becomes a large economic power and UK enacts protectionism by closing its doors to trade with China
- The UK is not investing sufficiently in education, infrastructure and support programmes, lack of co-ordination, teacher's perspective limited by lack of real work experience.
- Asian flu pandemic leads to high levels of death in EU and shortages of vaccines. Epidemic and pandemic made worse by cheap air travel and new threats from spread of tropical diseases and drug resistant strains of bacteria
- Industry top heavy with older workers
- Short sighted companies do not look more than 2-3 years ahead and have not planned for key workers retiring
- The weak UK economy restrains purchase of products. Engineering companies go out of business affecting local and UK economy.
- Government takes short term decisions rather than planning for the long term. As a result issues are arising as how to pay for the new technology the country needs to remain competitive
- Short term planning by government. No coherent strategy or long term plan providing leadership for the sector in the UK resulting in a lack of government investment. There are few engineers involved in government and little sense of focus on specific areas so the sector lacks the cutting edge
- Lack of skills training causes apprentices to leave the sector
- Health and safety concerns result in over protective legislation expensive to operate exacerbated by lack of similar legislation in China and India
- Technology overload and misunderstanding of new technology leads to fear of innovation by employers and employees
- No great technology bang, instead likely the development of existing technologies will need people with a broad range of skills to make machinery
- Technology seen as replacing jobs

- Social disorder and fragmentation – rich become richer and poor poorer. Increasing societal problems of mental health, drug abuse, increased gambling and fragmentation of families. More areas become gated communities with same race groups settling together
- Energy crisis and global warming resulting in a lack of water, food security becoming a global issue
- Population growth accelerates and increased immigration leading to strong competition for jobs. Increased costs of innovation leads to competition for access to capital.
- Increased litigation and more regulation from the EU therefore slower progress due to "drag**"**
- UK is too good at adapting old factories rather than building new facilities from scratch – facilities increasingly become out dated

2.1 Critical Success Factors to mitigate or avoid a negative scenario

- Manage greater expectations of what engineering can achieve
- Better education across society so that public understanding of manufacturing improves which leads to more funding and clear political will to support the sector.
- Engineering sector is perceived as high value
- Capacity building: creating the right company culture and environment
- Working with other industries and other technologies, look to other sectors to improve and create opportunity
- Better funding e.g. work based programmes for skills
- Influence the influencers – government and industry. Parliament and ministers need foresight
- Finance and political advantage for Scotland, N Ireland and Wales
- Make information more readily available, understood, up to date and trusted leading to more informed choices.
- Relationship between employers and school children to change culture and view of engineering
- Need to educate careers advisors on what engineering opportunities and types of jobs exist, encourage careers teachers to come to industry
- Influence parents to help children choose engineering – avoid educational snobbery. Children are excited by some technology like i-pods, phones cameras etc. How do we hook into this interest?
- Need to be proactive to respond to critical skills shortages
- Companies will have to pay more for engineers to attract them and keep them. Relative worth of people in terms of values to business
- Develop skills in house for example maintenance managers – improved maintenance skills would have a positive impact on the bottom line

2.2 Skills Needs

- Need people who are comfortable about managing different types of information and who can deal with conflicting information.
- Ability to understand and manage risk
- Ability to explain the engineering manufacturers point of view to the public
- Strong marketing and PR to promote the sector
- Acceptance of multi-discipline technical education
- Willingness to share information, knowledge and skills
- Social skills
- Language skills (management)

3 POSITIVE FUTURE SCENARIO

- Globalisation is a challenge; however UK is in a good position to exploit the advantages. The legislative framework is positive and takes account of health and safety issues within a risk benefit framework
- Investment in nuclear energy alongside renewables and developing other sources of clean energy for example from fusion is key to manufacturers and the availability of cleaner energy at lower cost is putting the UK in a strong position globally
- UK has an abundance of high quality workers coming towards retirement who can pass on their knowledge to younger workers.
- Manufacturing itself relies increasingly on computer-controlled tools, and as they become more sophisticated, so we will see more personalisation and greater customer involvement. Since the net allows this interaction from anywhere, customer location is not an issue. Designers may be in a very different location from the fabrication unit that builds their prototypes.
- The UK leads in technology development. There are high expectations of what this will mean to manufacturers of high specification materials that has strengthened the economic position of Britain.
- There is a stable political environment, with the government supportive of the engineering industry in recognition of value of the sector to the economy.
- Self government is key for Scotland/Northern Ireland/Wales – in control of own destiny
- There is a positive relationship between the manufacturing sector and society. The sector is involved in solving various environmental issues and leading debate on broad areas of influence including – fuel efficiency, stronger longer lasting products, chip products with built in sensors enabling products to react and respond for use in 'smart' environments. This has resulted in a more positive perception of the sector and increasing scope for solutions from science to large environmental problems. There is a higher level of trust in engineering and informed public debate.
- The manufacturing sector is recognised as developing high quality products that are manufactured to a standard that takes account of the environmental impact. The sector has been successful in making break through in environmentally benign manufacturing.
- There is a strong degree of ethical consensus. The image and awareness of the sector is positive with role models and sector champions. There are engineers in senior positions in both government and corporations who are able to present the science of engineering and market the ideas and concepts to people.
- Manufacturing is seen as a creative process that strongly emphasises aesthetics
- Engineering education and training is recognised as being world class with greater rigour in school science and engineering teaching.
- Teaching is recognised as a prestigious occupation and there are more engineers than ever teaching in schools. There is a strong college education and universities network with opportunities for people to move around from academic roles to business. There is funding for colleges to deliver suitable courses and there are more engineers than ever teaching in schools as older people were seconded who were passionate about their industry. This has resulted in young people being informed of the possibilities of science and engineering at the earliest age.
- There has been opportunity for a review of the education system to deliver good skills including strong language skills. UK education is now internationally held in high esteem. UK produces top quality science and engineering graduates who become leading engineers of the future.

- Technological innovation will be positive for the sector. UK has a strong reputation for innovation and a track record of people coming together from different disciplines to develop new products to respond to problems in the environment. New engineering companies developing technological solutions have resulted from cross - sector discipline problem solving. New communications technologies have been developed as well as new materials and clean fuel sources which are cheap and impact the cost of production
- Technology is enabling more control of the manufacturing process. Materials are changing impacting on how products are finished. There is more use of technology to get high quality metal products.
- The sector is no longer perceived as the 'metals sector' – advanced materials are seen as attractive for new graduates as new methods of production are developed. Knowledge of how to manufacture high quality products gives the UK competitive edge over China and India.
- Companies also recognise how quickly knowledge transfer can happen and are constantly looking to improve their own knowledge base. Teaching and learning becomes a core value in business. (A culture of development exists)
- The aging population and increased life expectancy is matched by better health care and work/life balance. People reaching retirement age are given the opportunity to monitor and coach younger workers.
- There is a truly global industry with demand from China and emerging markets. Globalisation has led to expansion in a large number of foundries in India and China not as safe as clean & safe as the UK so opportunity to promote this as positive for UK
- Africa and South America emerge as stable political forces and more balanced economies.
- Devolution and regional approach create a more positive environment
- Massive leaps in technology over the next ten years and increased need for more flexible staff to make use of technology.
- There is an open society with free movement of skilled workers providing a cheap and well trained workforce. Better at teaching the basics so all can read and are able to learn and motivated to learn
- Communications are making the world feel a smaller place and information available throughout the world – narrowing rich poor divide

3.1 Positive Scenario Critical Success Factors

- Excite kids into science and engineering industry – working with real life problems during school by working alongside skilled staff in industry
- There is a modern skills apprenticeship – practical, team building, applying knowledge
- Need to excite young people use a variety of influences e.g. media changes to promote positive engineering role models in creative and innovative ways: e.g. soaps, dramas, local engineer heroes
- New languages are learnt in UK stimulating better communication and there has been investment in management development enabling managers to be able to adapt to constantly changing situations.
- Investment in education facilities and enabling students to be ready for engineering jobs. Invest in equipment in schools and teaching staff, both private and government investment
- Industrial mentoring at all levels children through to staff, allowing teachers to spend time in industry or at a local business

- "Re-brand" engineering alongside science
    - High profile people to link science and engineering to kids interests (I-pods, F1 etc)
    - Improve perception of career in industry, learn best practice from other sectors
    - Identify and promote visible and high profile leaders to come out and shout about the industries
- Modern society with latest gadgets constantly improving require skilled innovation and engineering – UK appreciated for local and high quality
- Provide links between industry and colleges to ensure practical skills development. Collaborative problems require joint working to build links
- Develop local supply chain. Smaller companies are more agile but need to work together.
- Education in practical skills
- Economy suitable to support the cost of supporting costs of developing skills, funding education
- Engineer is not the policy maker – New role required.
- Courses, employer involvement with regular reviews of courses
- Careers advice to encourage young people into industry
- Practical skills highly developed
- Media coverage of engineering in schools - role models / engineers and scientists – TV programmes promoting UK technology engineering – whole process from design to manufacture
- Attractiveness of the Sector – to children / public
- Balance risk/reward
- Get the basics right: teacher training, link industry to relevant accredited training
- Opportunities for FE/HE dialogue with industry to create demand, training and education programmes
- Provide real experience of engineering in school and in the workplace. Lab availability, excitement about making real things, to engage kids.
    - Quality teaching, enthusiastic teachers.
    - Learn basic skills that are transferable
- Generation of policy and accountability of government
    - Policy – Vision of Engineering
    - Strategy and mechanism to drive it forward
- Creation of Learning Cycles
    - College courses developed jointly with industry - demand and supply interaction to define needs
    - Points system for colleges allowing explicit recognition of value of qualification from different colleges
    - Improve relevance of college education for business
    - Accessible and visible to students => marketable
- Education able to produce a good supply of well-qualified people. Capable, committed and energetic
- Allow people to operate without restrictions and are not prevented by legal and restrictive rules
- The strategy to manage the transition of workers from other countries has been successful enabling the UK to benefit from a supply of skilled people from other countries.
- People are receiving positive and balanced view of engineering and its role in the world.

- Having an ‘engineering mind’ as well understood and valued as having a ‘creative mind’
- Able to define a competitive edge - UK has ability to handle the changing global dynamics
- Leaders need to be educated in how to sell what engineering does and can deliver
- High profile role models to be able to communicate positive messages of engineering
- Industry and FE / HE work together to provide resources and create understanding of global issues that science and engineering can address
- Understanding and perception of different roles engineers play in society e.g. communications sector – broaden understanding of what engineers do leading to a change attitudes to engage and interest young people
- Look at all the good science and innovation can do to solve problems
- Support from society to encourage career progression, more women and people moving back to industry – paternity/maternity leave, career breaks “conversion” or “returnees” module
- Encourage positive attitudes in young people, desire to succeed and understanding reward
- Engineers and scientists committed to solving world problems and providing access to information and sharing problem and provision of resources
- Relationship between employers and school children to change culture and view of engineering
- Need to educate careers advisors on what engineering opportunities an types of jobs exist, encourage careers teachers to come to industry
- Influence parents to help children choose engineering – avoid educational snobbery
- Children are excited by some technology, ipods, phones cameras etc. how do we hook into this interest?
- Need to be proactive to respond to critical skills shortages
- Companies will have to pay more for engineers to attract them and keep them. Relative worth of people in terms of values to business
- Develop skills in house for example maintenance managers – improved maintenance skills would have a positive impact on the bottom line
- Universities producing people able to do R&D
- Teachers are inspiring
- Industry supports teaching
- Engineering more high status compared to other sectors
- Articulated as an holistic discipline with CPD
- Improved evaluation of what is happening – build and develop to ensure change is fit for purpose
- Recognised different routes to engineering
- Major campaign to change perceptions and association with sexy products – e.g. I Pods etc.
- Belfast Telegraph and others publishes ‘good news’ stories

3.2 Skills needs

- Trusted engineer/manufacturing translator(s) to work in government
- Innovators who have entrepreneurial skills - Innovation skills to adapt to change and opportunities from technology
- Industry trained, aware, experienced academics
- Cultural understanding, interpersonal skills
- Critical skills in engineering; demonstrable skills, systemic ability to solve problems**,** no fear of failure, prepared to go for something new and different and also learn from mistakes**,** positive attitude – have a "can do" view, can make it better – try again
- Need for change in industry's role in developing skills

4 Action Areas Summary – FROM Positive and Negative Scenarios

1. Improving the understanding and attractiveness of the engineering manufacturing industry to the public, teachers, parents and media

2. Lifelong learning through FE/HE/CPD. Encourage multi skills and flexibility. Make a step change in employers developing their own workforce

3. Rationalisation of funds. Industry and education work more closely together. Identify body to take ownership and provide funding to fill the skills gaps that exist now to change policy and culture to encourage colleges to encourage more industrial experience and success. Provide a simple funding framework to allow companies to deliver in-house training and encourage modular training that fits

4. Education Action – Train teachers to understand practical engineering and keep up to date

5. Create leadership and action orientated policy for the engineering sector in Scotland, N Ireland and Wales showing how this will achieve economic success ('what's in it for me')

6. Excite young people into engineering

7. Create people with the education, skills and attitudes that allow the UK to positively flourish in the engineering world and in society generally. Promote the image of the sector and get young people interested with real problems and solutions in industry. Industry and academia work together to show students how to behave in the workplace.

8. Vision from Government on policy and direction on energy – *this is incomplete as not worked through in workshops but considered important by industry representatives*

Action Areas from the Workshops

4.1. Improving the understanding and attractiveness of the engineering manufacturing industry to the public, teachers, parents and media

Action Areas:
Short Term

- Identify role models – lots of TV chefs etc. but no equivalent for engineers
- Encourage friendly/interesting engineers speaking to journalists
- Visibility through presenting key messages on TV
- More industry openness where there are 'best practice' examples and visits for journalists
- Provide link with key events e.g. sectors role in supporting the London Olympics. Encourage people in the sector to feel they are part of building the Olympic stadium or metal for Formula 1 racing cars

Medium Term

- Commission plays/docs/profiles in various media – science/engineering stories presenting science/engineering/manufacturing in a positive way
- Recognition at high government level of the value of the sector to the UK economy

Long Term

-

If implemented, what will be happening to show we are successful?

- Public understanding and appreciation
- Increase in young people and students interested in engineering careers. Parents encouraging their children to take up apprenticeships
- More positive engineering based media coverage
- The sector is seen as good for the UK and good for employment

Why aren't these things happening already?

- Lack of coordination
- Media resistance – bad news sells papers
- No strategy
- High fliers do not seek out MME sector as a career
- Parents do not consider metals industry as a place for their sons and daughters

<u>Likely Barriers</u>

- Funding (integrating "alignment") – may just need to align what is out there
- Ownership – some companies operating base is overseas
- Expertise
- Ability to influence – there is no new thinking to generate support for MME sector
- Market intelligence
- Resistance from media (commercial drivers)
- Good quality people chase the money which is not in MME sector
- Engineering and technology not commercialised in an every day way

How are we going to overcome those barriers?

- Leadership (Gov. others?)
- Central organisation must be identified
- Changing agenda – long term government funding but independence
- Creative specialists – branding, marketing, Joe public

Actions to take forward…

Short Term

- Identify role models / taskforce
- Leaders – names
- Government links
- Identify "heroes"
- Set up task force
- Build on the Olympics to excite people – clarify the importance of building the infrastructure to support the sports and that MME sector is the key to success – also build on role supporting Formula 1 racing etc.

Medium Term

- Commission media activities
- Game "make a new product"
- Commercial openness
- Renew / benchmarking

Who do we need to take action or help influence?

- Celebrities – anyone famous who is keen on making things – e.g. Top Gear presenters – James May and Michael Gambon
- Government
- Role of Semta to get success stories

4. 2 Lifelong learning through FE/HE/CPD. Encourage multi skills and flexibility. Make a step change in employers developing their own workforce

Action Areas:

Short Term:

- Design and mobilise.
- Encourage discussion of CPD - value, sharing best practice models, FE/HE funding, CPD incentives
- Develop the mature work force and up skill from within to address the short-term lack of skills

Medium Term: Execute plans

Long Term: Measure, Learn, Integration and Development

If implemented, what will be happening to show we are successful?

- Culture of CPD embedded
- Support by incentives > government support
- Managers keen to sponsor, support, coach, mentor and have skills to do so
- Companies provide funds
- Government provide fiscal incentives to learn
- Provides and delivers tailored programmes
- Companies require demonstrations of the benefits of investing in their staff – case studies
- Companies benefit from skilled staff
- Individuals benefit from careers/rewards ongoing employment
- Active network of all above partners

Why aren't these things happening already?

- Complex multi-agency stakeholder management – lots of over lapping bodies, unclear who is doing what
- Complexity of current provision – hard to understand and access

Likely Barriers?

- Companies not sharing best practice
- Interface between industry and colleges
- Selling individuals the value of CPD
- Finding campaigners who can influence and mobilise people to realise this vision.

How can we overcome barriers?

- Identify champion employers to share case studies / models
- Focus funding on industry skill needs – fund in-company courses and the certification process which will encourage companies to send staff through the training process
- Find and develop champions for skills

Actions to take forward…

Short Term

- SEMTA platform to share models and best practice on CPD
- SEMTA to promote the success of organisations with a learning culture (value to people and bottom line)

Medium Term

- Set up platform to share college / industry / SEMTA to share industry requirements
- Workshops with FE to discuss delivery of industry skills: design modular courses that suit specific manufacturing skills sets

Long Term

- Develop mechanisms for efficient and effective delivery of CPD skills

Who do we need to take action or help influence?

- LSC
- Government agencies at regional level
- Senior corporate stakeholders
- Colleges and business (plus Universities?)

4. 3 Rationalisation of funds. Industry and education work more closely together. Identify body to take ownership and provide funding to fill the skills gaps that exist now to change policy and culture to encourage colleges to encourage more industrial experience and success. Provide a simple funding framework to allow companies to deliver in-house training and encourage modular training that fits

Action:
Short Term

- Filling the skills gaps that exist now
- Identify body to take ownership and provide funding – one stop shop for obtaining funding

Medium term

- Address school/college/parent perceptions – customers are individuals not the sector
- Introduce an independent government and industry body that brings everybody together with funding outside political control

Long term
Provide education and awareness of the sector that is relevant to industry needs

If implemented, what will be happening to show we are successful…?

- Industry would have access to a pool of ready skilled apprentices
- Engineering perceived better by public (young people and parents)

Why aren't things happening already?

- Lack of ownership no coordination everything is at a regional level
- No buy in from schools, colleges and business
- Industry support – financial
- Currently no one body has the remit – lack of connectivity and national approach
- Industry has difficulty understanding the funding initiatives available

Likely Barriers
Schools / colleges - Lack of suitable experienced teachers
Also health safety issue and Nanny State approach
Negative pre conception of courses unable to meet specialist requirements
No "can do" culture

How can we overcome barriers?

- Introducing financial incentives
- Cost of registration and certification of candidates is provided by funding not the employer
- Fill gap in understanding. Set policy and influence funding to take regional funding forward nationally.
- Engaging and educating teachers – “want to do” and “allowed to do” – making science / engineering exciting
- More teachers have time and interest in spending quality time in industry

Actions to take forward

Short term

- A clear plan of how it can work – create a way to market the sector
- Direct the funding streams
- Help companies to understand the return on investment in people

Medium term

- Changing culture and mind set of individuals
- Encourage more industrial experience
- Support the National Curriculum by working with EBPs so that science curriculum is linked to understanding of the engineering sector

Long Term

- Sustainability – funding longer term
- Industry and academia working together to pay for courses, setting agendas together.

Who do we need to take action or help influence?

- Influence Minister for Further and Higher education
- LEAs/Schools
- LSC – following Leitch Report recommendations
- Lobby industry to get involved
- Regional lobby groups

Next Steps

Identify a "person" or organisation to kick-start a National programme, there has to be a joined up approach

Fill gap in understanding. Set policy and influence funding to take regional funding forward nationally.

4.4 Education Action – Train teachers to understand practical engineering and keep up to date

Action:
Short Term

- Challenging stereotypes of manufacturing in schools
- Making sector more responsive to issues of concern – e.g. energy/environment
- Initiate discussion / managing public perception
- Fill the skills gap
- Identify body to take ownership and provide funding

Medium Term

- Influencing engineering knowledge within other curricular areas
- Prove the value of manufacturing to the economy, society and the environment to government so they back with resources

Long Term

- Train teachers to do practical 'making' and keep up to date and ensuring all teachers have an awareness of the relevance and connection with other curricula areas
- Industry led degrees and vocational training
- Provide education that is industrially relevant
- Would need to be applied to all sectors

If implemented, what will be happening to show we are successful…?

- More positive headlines in the media
- More public figures supporting engineering /manufacturing
- League table reflects positive changes; wider curriculum
- Teachers encouraged to do practicals and supported to do these
- Industries would have access to a pool of ready skilled young people
- Engineering/manufacturing perceived better by the public

Why aren't these things happening already…?

- Patchy funding / lack of leadership
- Industry support – financial
- Currently no-ones remit
- Lack of connectivity
- Different national approaches
- Teachers already too busy / too exam pressured / red tape / targets for league tables
- Not thinking UK plc versus regional: which one do we go for?

Likely Barriers…?

- Getting audiences more integrated in teaching and giving commercial knowledge
- Schools: Lack of experienced teachers
- Nanny state
- Negative pre-conception of course
- No "can-do" culture

How can we overcome barriers…?

- Change reward structure / find alternative way around it
- One organisation to look after engineering / funding / teaching
- Introduce financial incentives
- Engage and educate teachers: want to do / allowed to do
- Making science and engineering exciting

Actions to take forward…

School visit to focus on future science, technology and engineering

Who do we deed to take actions or help influence…?

- Colleges – ensure they have the industrial experience and equipment to provide the courses
- Opportunity to replicate in other sectors: added value, sustainability
- Government - policy decision makers who can influence funding to take regional funding forward nationally .The regional approach within the UK does not provide a critical mass – need some representation at a national level
- Trade association
- SEMTA
- Lobby industries to get involved
- Regional groups
- Industry, Teachers, Media, Parents

Next Steps…

Identify “person” and fund to kick start national programme. Has to be a joined up approach.

Generation of Policy and accountability of Government for the policy – Vision of science/technology/engineering strategy and mechanism to drive the vision forward

4.5 Create leadership and action orientated policy for the engineering sector in Scotland, N Ireland and Wales showing how this will achieve economic success ('what's in it for me')

Action Areas:
Short Term:

- Identify who is needed to generate the policy
- Government buy in
- Working with stakeholders including senior industry figures
- SWOT analysis by steering group
- Define policy vision and actions to achieve economic success that shows 'what's in it for me' (i.e. government ministers)

Medium Term:

- Refine policy obtaining buy in from stakeholders
- Develop a plan that proves 'what's in it for me' to government and business
- Agreed criteria or support and action

Long Term:

- Creation of fully integrated industry in Scotland/N Ireland/Wales

If implemented, what will be happening to show we are successful?

- Sustainable and growing sector
- Positive public image and respect for the sector in Scotland/N Ireland/Wales and worldwide
- Understanding of key measures of the sector. e.g. number of companies, recognised engineers, revenue generated, social stability
- Environmental benefits improve – decline in carbon levels, improving health of groups like the elderly and reduced cost of manufacturing with quality of life to the fore – social benefit
- Skills migration – more workers staying in and returning to Scotland/ N Ireland / Wales

Why aren't these things happening already?

- No common goal or focus
- Lack of interest from ministers

Likely Barriers

- Political agenda is too short a timeframe
- Aligning the views of different stakeholder groups

How can we overcome barriers?

- Explaining linkages and relevance to big problems in environment and energy supply today
- Create part interest in issue

Who do we need to take action or help influence?

- Scottish/N Ireland/Welsh Governments
- SSC's
- Colleges and Universities
- Funding councils
- Schools
- Industry, Companies
- Regulatory authorities
- Customers, Public
- School children, students

4.6 Excite young people into engineering (see also 4.7)

Action Areas
Short Term:

- Establish network – schools, companies, universities, colleges and business groups to plan process of engagement of children and students in science, technology and engineering. Need to influence good young people early

Medium Term:

- Children offered a "week in engineering" at local businesses. Videoconferencing available for schools to pool benefits of visiting engineers being made available to the schools throughout the year

Long Term

- Provide mechanisms to network with companies based in local area
- Ensure people entering the industry are valued. Find out the value of the sector to the economy to make the case

If implemented what will be happening to show we are successful?

- Recognition of importance of engaging young people in engineering

Why aren't these things happening already?

- Business apathy
- Schools curriculum – time/resources
- Lack of vision and leadership

Likely Barriers?

- Funding
- Different agendas when establishing a network
- Need a vision for the way forward
- Apprenticeships seen as a failure. Demise of the technical college means there is a stigma attached to developing a trade rather than going to university

How can we overcome barriers?

- Take on good apprentices at GCSE level and offer career paths and advertise success
- Work with companies to overcome funding issues by providing resource and staff
- Keep idea simple – win/win for different groups to participate, provide benefits to all groups but focus on what is a benefit from them

Actions to take forward

- 0-6 months SEMTA formulate a vision for how this would work and the benefits

4.7 Create people with the education, skills and attitudes that allow the UK to positively flourish in the engineering world and in society generally. Promote the image of the sector and get young people interested with real problems and solutions in industry. Industry and academia work together to show students how to behave in the workplace. (see also 4.6)

Short term:

Promoting the image

- Getting young people interested
    - Visits, media, present the scope and beyond, provide example of what we have done and the people who do it

Medium Term:

Industry provides real world examples of how to behave in the workplace. Students need to be invited to look at "real" problems and solutions in industry. Industry helps education in return

Long Term:

University, college and industry aligned

If implemented, what will be happening to show we are successful?

- Research being undertaken to make case for change

Why aren't these things happening already?

Nobody has taken initiative to stop this, just goes round and round

Likely Barriers?

- Government funding
- Not enough time in production – economics
- Key constraint is management of manufacturing companies, how do we keep good people in industry?

How do we overcome these barriers?

- Need a strong leader to take initiative and bring people together

Actions to take forward

- Finding a catalyst to free the cycle, to create a changed view
- Identify the people able to take the lead

4.8 Vision from Government on policy and direction on energy

Action:

Short Term
Input to government to develop government policy and direction on energy

If implemented what will be happening to show we are successful…?

Likely barriers…

How can we overcome these barriers…?

Actions to take forward…

Short Term
Semta to articulate the needs of industry to government and help companies understand future skills requirements

Medium Term

Long Term